

PORT PHILLIP SURVEY 1957-63 FORAMINIFERIDA

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Abstract

Two hundred and seventy-eight species and subspecies of Foraminiferida are recorded from the sediments collected during the Port Phillip Survey, augmented by littoral material collected by the writer. The distribution of foraminiferids within and just outside Port Phillip is discussed. New taxa proposed include one new genus, *Pseudohelenina* and 36 new species and subspecies, as follows: *Reophax barwonensis*, *Haplophragmoides pusillus*, *Anunobaculites? barwonensis*, *Quinqueloculina poeyana victoriensis*, *Triloculina sabulosa*, *Scutuloris parri*, *Lagena bassensis*, *Lagena nepeanensis*, *Lagena lonsdalensis*, *Lagena portsaensis*, *Bolivina pendens*, *Guttulina yabei attenuata*, *Laryngosigma australensis*, *Oolina guttaformis*, *Fissurina pseudoformosa*, *Fissurina crassiannulata*, *Fissurina furcata*, *Fissurina multipunctata*, *Euuvigerina compacta*, *Hopkinsina victoriensis*, *Discorbinella infrapapillata*, *Rugidia simplex*, *Valvulineria minutissima*, *Valvulineria victoriensis*, *Elphidium granulosum*, *Elphidium vitreum*, *Elphidium articulatum multicameratum*, *Elphidium earlandi avalonense*, *Elphidium gunteri corioense*, *Rosalina parri*, *Planulina bassensis*, *Cibicides phillipensis*, *Cibicides wattsi*, *Cassidulina victoriensis*, *Nonionella vortex*, *Trichohyalus australis*. Page references to the above are given in the Distribution Lists.

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Introduction

The material received for study consisted of a large number of small samples of material which had been washed, graded and used in a study of the bottom sediments of Port Phillip (Beasley 1966). Full details of depths and the nature of sediments are given in the reference cited.

For the purposes of the Survey Port Phillip was subdivided into 70 Areas (Fig. 1), some of which were wholly or mostly on land. Material was not available for some of the marine Areas (14-15, 24, 34, 52, 65, 70). Fortunately, most of these are on the fringe of the Survey and not critical in respect of distribution. Areas 34 and 52 are located in the middle of the Bay, where the foraminiferal fauna is scanty and there is little variation between Areas. In the remainder of the marine

Areas, from 1-4 station samples were available for study.

To these original samples were added shore collections made by the writer at nine stations inside and outside Port Phillip. These are listed in Table 1, with sufficient detail to enable location on Fig. 1. These collections were of value because they were generally more productive of species than the dredgings in adjoining Areas, and provided evidence of the distribution of shallow-water species which were rare in or absent from the deeper water samples. For example, the common Bass Strait species *Discorbis dimidiatus* occurred only occasionally in the dredgings from the inner Areas of Port Phillip, but was abundant in material collected from the sandy beach at Altona near the N. end of the Bay.

One of the shore stations, the sandy beach on the right bank of the Barwon River near its mouth at Barwon Heads (Area 56) is notable for the rich assemblage found there, presumably deposited by some unusual combination of wave and current action. This is the only Holocene locality in Victoria to have had a thorough taxonomic study made (Parr 1945), when 142 species were recorded, and it has provided many of the new species and records made in the present work. Another station

further up the Barwon River near the N. edge of Area 56 was interesting in illustrating the discontinuous distribution of species otherwise confined to the shallow muddy shores of Swan Bay and the W. littoral of Port Phillip.

As the bulk of the material studied consisted of dried and sifted sediments, no indication was given of the actual living population, and the present work must be considered only as a faunal inventory, to be refined and confirmed or otherwise by future studies of material collected in the living state and appropriately preserved.

The distribution of Foraminiferida in the Survey is listed by Area numbers in the Systematic Account in respect of each taxon dealt with. In the case of holotypes, the station number is recorded in addition. Distribution sheets showing records by Area and Station numbers have been prepared for holding at the Museum in the form of transparencies from which prints can be made available to any workers requiring more detailed information. All station slides and single slides of holotypes and figured specimens are deposited with the National Museum of Victoria. Holotypes and figured specimens are identified in the text by Museum Registration numbers. The classification used is that of Loeblich and Tappan

(1964) with modifications arising from later work.

Previous Work

The earliest study of material referred to as from Melbourne, Australia, was that of Parker and Jones (1865), when some 32 species were listed or described, including some well-known local species such as *Discorbis dimidiatus* and *Annulopatulina annularis*. Parr (1932) has cast doubt on the provenance of this material, mainly on the grounds of the inclusion of what is now known as *Cribrobulimina mixta* Cushman (= *Valvulina mixta* Parker and Jones 1865, nom. nud.). The present writer concurs fully with this judgment. *C. mixta* has never since been recorded from Victorian shore sands, though it is very common on the South Australian coast and may eventually be found on the far W. coast of Victoria. It does occur in the Pleistocene interglacial deposits of Port Fairy, W. Victoria, together with a fauna giving evidence of warmer conditions than the present, but has evidently withdrawn from local waters following the onset of cooler conditions in the later Pleistocene and Holocene.

This point is made because authors continually cite Melbourne as the type locality of species described in Parker and Jones' 1865 paper. It is far more likely that this material was collected on the S. Australian coast and loosely attributed to 'near Melbourne'.

Subsequent authors such as Watts (1883) and Chapman (1902, 1909, 1915) were conservative in referring local forms to well-known N. Hemisphere species, though Chapman (1909) recognized one new species and three new varieties.

During 1930-1940, various studies of genera and particular species by Chapman, Chapman and Parr, Parr, and Parr and Collins contained references to local Holocene species, in particular Parr (1932) in which a number of new species and varieties were described from Victorian Holocene localities. The first really critical study of a Holocene Victorian fauna was that of Parr (1945) dealing with the rich thanatocoenose at the mouth of the Barwon River. This falls within the area of the Port

TABLE 1
Location of Shore Collections

Area	Station Number	Location
5	C1	Beach sand, Altona Bay
16	C2	Beach sand, Kirk Point
26	C3	Beach sand, Avalon Beach, Corio Bay, N. of dredge station 300
25	C4	Beach sand, North Shore, Corio Bay, W. of station 128
49	C5	Beach sand, NW. shore of Swan Bay, W. of station 237
49	C6	Beach sand, Swan Bay, SE. corner of Area 49
58	C7	Beach sand, Point Lonsdale, N. of station 153
56	C8	Beach sand, right bank of Barwon River near mouth
56	C9	Muddy sand, right bank of Barwon River on N. boundary of Area 56

Phillip Survey, and material from this locality has produced many new and interesting records.

Studies of off-shore material such as the 'Challenger' station 162 off East Moncoeur Is., Bass Strait (Brady 1884), the 'Endeavour' stations at the E. end of Bass Strait (Chapman 1941), and the Tasmanian stations of the BANZAR Expedition (Parr 1950) also have relevance to the fauna of the Lower Bay and the adjacent Bass Strait coastline.

The foraminiferal fauna of Port Phillip and the coasts of Bass Strait is now fairly well documented. What is now required is a detailed and quantitative study of the living populations and their ecology.

Fossil Admixtures

Any study of the Foraminiferida based on dead tests collected in or near Port Phillip must take into account the possible occurrence of reworked fossils derived from Tertiary or Quaternary sediments exposed as coastal sections and submarine outcrops. Many of these sediments consist of easily erodable clays, rich in foraminifers of continental shelf facies which are frequently unstained, uneroded, air-filled and practically indistinguishable from recently living specimens.

Dr Taylor (pers. comm.) has pointed out that many species now living in Victorian waters have a long range in local Tertiary formations. The presence of such species in Holocene material therefore requires care in interpretation.

In the inner Areas of Port Phillip recognition of Tertiary admixture is possible on ecological grounds. At station 127, Area 38 the existence of a submarine outcrop of Fyansford Clay in the sampling area is inferred from a mixed assemblage containing stillwater species characteristic of the general locality together with a shelf element which could be matched in the Miocene deposits of Curlewis, some 6 km to the E. Elsewhere in Port Phillip, no evidence of Tertiary admixture was found, suggesting that dispersal from known Tertiary exposures is very local.

On the Bass Strait coast, Tertiary cliff and submarine exposures occur at Ocean Grove,

less than 1 km E. of Station C8, Area 56 at Barwon Heads. Evidence of Tertiary admixture here is given by the presence of restricted Miocene species such as *Tubulogenerina ferox* (Heron-Allen and Earland). The rich thanatocoenose found at this station contains both the normal shallow water fauna of the Bass Strait coast and a strong shelf element, the latter presumably transported from deeper water by onshore currents. Long-ranging continental shelf species recorded from this station must therefore be subject to some doubt as to their provenance.

However, a check on the existence of such species in the living condition is afforded by the dredgings made in the vicinity of Port Phillip Heads, where downthrow of some hundreds of metres in Pleistocene time (Bowler 1966) precludes the possibility of submarine Tertiary exposure. The rich assemblages obtained from stations just within Port Phillip confirm the recent presence of species which, if recorded only from Barwon Heads, would be subject to some doubt.

A further source of admixture lies in the extensive areas of coastal and submarine outcrops of Pleistocene aeolianite on the Lower Bay and Bass Strait coasts. Foraminifers from this source tend to be leached and distinguishable from fresh specimens, and consist of the smaller and lighter forms found on the present Bass Strait beaches. Their presence, accordingly, is of little significance in view of the limitations of the material studied.

There remains, however, the possibility of derivation from Last Interglacial deposits in the areas close to the entrance to Port Phillip, which could account for the presence of rare specimens of species having a general warm water distribution. Confirmation of the local existence of such species in the living state must await the collection and preservation of fresh material, but as this limitation applies to the present collections generally, it appears reasonable to include them in the records.

Distribution and Faunal Regions

Analysis of the distribution of foraminiferal taxa (species and subspecies) within the area

of the Survey has led to the recognition of two main faunal regions, as follows:

1. *Bass Strait and the Lower Bay*, including Areas 50 (part), 56, 58-62, 66-69, with a weak extension off Indented Head (42-43). No material was available from Area 57, but its position in Bass Strait includes it in this region.

Within this region 30 taxa, all comparatively rare, were found only in Bass Strait stations. 143 taxa were found in Bass Strait and the Lower Bay only, 56 were distributed throughout the Survey area, 13 were found only in the Lower Bay, and 17 were common to both the Lower Bay and the Inner Bay (definition below), a total fauna of 259 taxa.

The Bass Strait element of 143 taxa forms a major part of the total of 229 recorded for the Lower Bay. How far this is due to transport from Bass Strait by tidal currents is a matter for conjecture which can only be settled by studies of the living population. The comparative rarity of taxa found only in Bass Strait suggests that transport may well be a factor.

The dividing line between the Lower and Inner Bay regions, in terms of Areas, is sharply defined except off Indented Head, where Bass Strait influence appears to wane gradually along the coast. For example, the Lower Bay Areas 50 and 59-62 provide records of 137, 97, 97, 153 and 81 taxa respectively, whereas the immediately adjoining Areas to the N. and E., 51-54 and 63, provide only 11, (no sample), 6, 10 and 21 taxa respectively.

This is partly due to the fact that these Areas roughly correspond to the S. end of the 18-24 m central basin (Fig. 1), which as other authors have noted is comparatively barren of animal life. However, no Area of the Inner Bay produced as many as 50 taxa, and the Lower Bay is therefore outstanding in the variety of its foraminiferal fauna. The present evidence suggests that the Lower Bay as defined is the area of tidal intrusion of the oceanic water mass, bringing a typical Bass Strait benthic fauna with a small pelagic element.

2. *The Inner Bay*, comprising all Areas within Port Phillip other than those listed as in the

Bass Strait-Lower Bay region, and including Swan Bay (Areas 49, part of 50), a shallow, land-locked body of water with a restricted entrance having a small foraminiferal fauna similar to that of the W. littoral of Port Phillip.

Ninety taxa were recorded for this region, of which 56 were of general distribution, 17 were found also in the Lower Bay, and 17 were restricted to the Inner Bay.

The central basin below the 18 m line was the least productive area, having a limited fauna of species of wide distribution, such as have elsewhere been found to persist in the least favourable conditions. In this case siltation may be the unfavourable factor. Areas to the N. and E. approaching the outlets of the Yarra and Werribee Rivers respectively are distinctly more productive than the central basin, so that salinity variation does not appear to be the inhibiting factor, while depth differences are minor. The commonest species in the central basin are *Ammonia aoteanus*, *Elphidium* spp., *Bulimina marginata*, *B. elongata* and *Haplophragmoides pusillus*, with *Ammonia* dominant in most Areas.

Beyond the central basin to the N., E. and W. coasts, *Elphidium* spp. are distinctly dominant in numbers, with large polymorphinids (*Guttulina regina* and *G. yabei attenuata*). There are minor areas of concentration of particular species, e.g. Areas 54 and 55 off Mornington where *Reophax scorpiurus* is dominant in a small assemblage, and Area 12 where *Haplophragmoides pusillus* is similarly dominant.

The shallow and muddy W. littoral has much in common with Swan Bay, such species as *Trochammina inflata* and *Ammotium australiensis* being particularly common and well-developed. Though not directly connected with Port Phillip, station C9 in the Barwon estuary on the N. Boundary of Area 56 shows similarity to Swan Bay and the W. littoral of Port Phillip, with the addition of a tide-transported element of Bass Strait origin. One species found here, *Amnibaculites? barwonensis*, did not occur elsewhere in the Survey material.

Distribution Lists

(asterisks denote proposed new taxa)

1. Bass Strait only:

Ammodiscus mestayeri
AnnulopateUina annularis
Cassidulina sp. A.
Ceratobuliminoides bassensis
Delosina complexa
Elhrenbergina aff. *glabra*
Epistominella exigua
Fischerinella helix
Fissurina foraminata
F. orbignyana
Glandulina laevigata
Globulina gibba globosa
Lagena implicata
L. spiralis
L. victoriensis
 **Laryngosigma australiensis* (p. 26)
Oolina borealis
Planispirulina dimidiata
Planodiscorbis grossepunctatus
Planularia australis
Plectofrondicularia aff. *californica*
Quinqueloculina vulgaris
Reophax friabilis
Robertina tasmanica
Stomatorbina concentrica
Spiroloculina aequa
Triloculina bertheliniana
Trochammina appressa
Trochammina sp. A
Ungulatella pacifica

2. Bass Strait and the Lower Bay

Amphicoryine hirsuta
A. scalaris compacta
Angulodiscorbis pyramidalis
Anomalina tasmanica
Anomalinoides nonionoides
Astaculus bassensis
Astrononion australe
Baggina phillipinensis
Bolivina decussata
B. lobata
B. subtennis
Bolivinella folium
 **B. pendens* (p. 24)
Bronnimammia haliotis
Buliminoides gracilis
B. madagascariensis
Canceris auriculus
Cassidulina delicata
C. laevigata
Cibicides sp. A
 **C. phillipensis* (p. 49)
 **C. watti* (p. 49)
Clavulina difformis
Dentalina mutsui
D. subemaciata
 **Discorbinella infrapapillosa* (p. 35)
Elhrenbergina aspinosa
Elphidium crispum
 **E. vitreum* (p. 43)

Euuvigerina bassensis
 **E. compacta* (p. 33)
Fijiella simplex
Fissurina contusa
 **F. crassiannulata* (p. 28)
F. fasciata
 **F. furcata* (p. 28)
F. lacunata
F. marginata
 **F. multipunctata* (p. 28)
F. pacifica
 **F. pseudoformosa* (p. 28)
F. quinqueannulata
Frondicularia compta villosa
Gaudryina convexa
Glabratella australiensis
G. patelliformis
G. pulvinata
Globigerina bulloides
Globigerinoides trilobus
G. ruber
Globocassidulina minuta
Globorotalia inflata
G. hirsuta
G. truncatulinoides
Gypsina vesicularis
Gyroidina soldanii
Heronallenia lingulata
H. translucens
Karrerina maoria
 **Lagena bassensis* (p. 22)
L. chasteri
L. distoma-margaritifera
L. elongata
L. favosopunctata
L. flatulenta
L. flexa
L. gracilis
 **L. lonsdalensis* (p. 22)
 **L. nepeanensis* (p. 22)
 **L. portseaensis* (p. 23)
L. ramulosa
L. striatopunctata
Laryngosigma williamsoni
Lenticulina australis
Martinottiella primaeva
Miliolinella subrotunda
Missippina pacifica
Neoconorbina frustata
Orbulina universa
Oolina caudigera
 **O. guttaformis* (p. 27)
O. melo
O. pseudocatemulata
O. variata
Ophthalimidium circularis
Parrellina verriculata
Patellinella inconspicua
Pavonina trifornis
Peneroplis planatus
Planispirulina denticulata
Planispirinoides bucculentus
Planodiscorbis rarescens
Planularia patens
 **Planulina bassensis* (p. 48)
Planulinoides biconcavus
P. disparilis

P. planoconcaus
Notorotalia clathrata
Pseudobulimina chapmani
 **Pseudohelenina collinsi* gen. nov. (p. 37)
Pullenia bulloides
P. quinqueloba
Pyrgo denticulata
Quinqueloculina anguina arenata
Q. baragwanathi
Q. bradyana
Q. moynensis
 **Q. poeyana victoriensis* (p. 16)
Rectobolivina dimorpha pacifica
Reussella armata
Rosalina anglica
R. australis
R. bertheloti
R. coronata
R. kennedyi
R. pustulata
R. williamsoni
 **Rugidia simplex* (p. 38)
 **Scutuloris parri* (p. 18)
Sigmoidella kagaensis
Sigmoilina australis
Sigmoilopsis sabulosa
Sigmomorphina undulosa
Siphonina tubulosa
Sphaeroidina bulloides
Spirillina inaequalis
S. vivipara
Spiroloculina angusteoralis
S. communis
S. disparilis
S. sublimbata
Spiroplectammina atrata
Textularia australis
T. kerimbaensis
T. pseudogramen
Torresina involuta
Tretomphalus concinnus
T. planus
Trifarina angulosa
T. bradyi
T. elliptica
 **Triloculina sabulosa* (p. 18)
T. striatotrigonula

3. Bass Strait, Lower Bay and Inner Bay

Acervulina inhaerens
Ammonia aoteanus
Astrononion novozealandicus
Bolivina compacta
B. pseudoplicata
B. robusta
B. subreticulata
Brizalina striatula
Bulimina marginata
Cassidulina carinata
 **C. victoriensis* (p. 52)
Cassidulinoides chapmani
Cibicides mayori
Clavulina multicamerata
Cyclogyra planorbis
Dentalina guttifer
Discorbis dimidiatus

Elphidium advenum
E. argenteum
 **E. articulatum multicameratum* (p. 43)
 **E. gunteri corioensis* (p. 44)
E. limbatum
E. macellum
E. sculpturatum
E. selseyense
E. simplex
Fissurina lucida
Florilus scapha
Fursenkoina schriebersiana
Globocassidulina subglobosa
Guttulina regina
G. silvestrii
Lagena crenata
L. perlucida
L. striata
L. sulcata
Lenticulina gibba
Miliolinella labiosa
Nubecularia lucifuga
Patellina corrugata
Planorbulina mediterraneensis
Quinqueloculina lamarckiana
Q. poeyana
Q. seminulum
Q. subpolygona
Rectobolivina digitata
R. raphanus
 **Rosalina parri* (p. 46)
Spiroloculina antillarum
Syratkina australiensis
Triloculina oblonga
T. trigonula
Trochammina tasmanica
Turrispirillina depressa
Siphovigerina canariensis
Vaginulina vertebralis

4. Lower Bay and Inner Bay

Ammotium australiensis
Bulimina echinata
B. elongata
 **Elphidium earlandi avalonense* (p. 43)
Florilus grateloupi
Guttulina pacifica
 **G. yabei attenuata* (p. 24)
 **Haplophragmoides pusillus* (p. 9)
 **Hopkinsina victoriensis* (p. 34)
Neoconorbina terquemi
Nonionella cf. parri
Reophax scorpiurus
Textularia tenuissima
Triloculina tricarinata
Trochammina bartrumi
T. ochracea
Vertebralina striata

5. Lower Bay only

Chrysalidinella dimorpha
Cibicides lobatulus
Dimorphina sp. A
Massilina ammophila
Neoconorbina tuberocapitata

Nodosaria perversa
Nonionella pulchella
**N. vortex* (p. 54)
Oolina hexagona
Remaneica plicata
Saracenaria italica
S. latifrons
Spirillina pectinimarginata aspinosa

6. Inner Bay, Swan Bay and Upper Barwon

Ammobaculites exiguus
Ammouia tepida
Cassidulinia inflata
Elphidium evolutum
**E. granulosum* (p. 43)
Hopkinsina pacifica
Miliammina fusca
Nonion depressulus
Planorbulina sp. A
Reophax sp. A
**R. barwonensis* (p. 8)
R. dentaliniformis
Spiroloculina lucida
**Trichohyalus australis* (p. 55)
Trochammina inflata
**Valvulineria minutissima* (p. 39)
**V. victoriensis* (p. 39)

7. Upper Barwon only

**Ammobaculites? barwonensis* (p. 9)

SYSTEMATIC ACCOUNT

Order FORAMINIFERIDA

Suborder TEXTULARIINA

Superfamily AMMODISCACEA

Family AMMODISCIDAE

Subfamily AMMODISCINAE

Genus AMMODISCUS Reuss, 1862

1. *Ammodiscus mestayeri* Cushman

Ammodiscus mestayeri Cushman, 1919, p. 597, pl. 74, figs. 1-2; Parr 1945, p. 193, pl. viii, figs. 1-2.

One specimen only, from Barwon Heads (56-C8).

Superfamily LITUOLACEA

Family HORMOSINIDAE

Subfamily HORMOSININAE

Genus REOPHAX Montfort, 1808

2. *Reophax scorpiurus* Montfort

Reophax scorpiurus Montfort, 1808, p. 330, 83° genre; Brady, 1884, p. 291, pl. xxi, figs. 12-17; Chapman 1909, p. 126; Parr 1932, p. 3, pl. 1, fig. 3; 1950, p. 268.

This cosmopolitan species is very common in Areas 54 and 55 off Mornington, with occasional specimens elsewhere, mainly in the E.

and central regions. Its comparative abundance in the Mornington area may be related to the greater availability of the angular quartz grains from which it constructs its test, derived from nearby granitic rocks.

Distribution: 12, 23, 30, 32-33, 36, 46, 54-55, 63, 68.

3. *Reophax friabilis* Parr

Reophax friabilis Parr, 1932, p. 3, text-fig. 1a, pl. 1, figs. 2a-b.

Three specimens from Barwon Heads (56-C8) agree with Parr's description. His specimens were from Point Lonsdale (58).

4. *Reophax* cf. *dentaliniformis* Brady

Reophax cf. *dentaliniformis* Brady, 1884, p. 293, pl. xxx, figs. 21-22.

One three-chambered specimen, 1.2 mm in length, from Corio Bay (37-296) has the arcuate form, elongate final chamber and produced aperture of Brady's species, which is world-wide in distribution. Previous records of this species are from deep water, which raises some doubt as to the identity of the present specimen from 3.7 m in a shallow land-locked bay.

5. *Reophax* sp. A

This is one of the *R. scotti* group, close to *R. catella* Höglund, which has a similar wall structure and chamber form but is about half the length with twice as many chambers. It is understood that this species is being described as new in a forthcoming work on the foraminifera of Westernport, Vict., by Mr K. N. Bell, and it is therefore only recorded as occurring in Port Phillip, in the following Areas: 5, 26-28, 39, all in the W. Bay.

6. *Reophax barwonensis* sp. nov.

Pl. 1, fig. 1

Test straight or slightly curved, initial chamber bulbous and wider than the next following, later chambers 10-12 in number, broad and low with slightly depressed sutures and increasing slightly in width toward the distal end. Wall composed of sand grains of varying size, roughly finished. Aperture rounded, terminal, in a slight depression in the apertural face.

Holotype from 56-C9, Barwon River estuary, Reg. No. G2113. Length 0.57 mm, breadth 0.14 mm.

This small species is common at the type locality and was also found in Areas 5, 17, 26, 37 and 49, all of which are shallow muddy locations.

Family RZEHAKINIDAE

Genus *MILIAMMINA* Heron-Allen and Earland, 1930

7. *Miliammina fusca* (Brady)

Quinqueloculina fusca Brady, 1870, p. 286, pl. 11, figs. 2a-c.

Miliammina fusca (Brady). Parker and Athearn 1959, p. 340, pl. 50, figs. 11-12; Albani 1968, p. 95, pl. 7, figs. 1-2.

Very abundant in the Barwon estuary (56-C9). Specimens were similar to those figured by Albani from Port Hacking, N.S.W., in a somewhat similar environment. Other specimens occurred sparsely in the W. Bay, in Areas 5, 7, 18, 26-27, 31 and 38.

Family LITUOLIDAE

Subfamily HAPLOPHRAGMOIDINAE

Genus *HAPLOPHRAGMOIDES* Cushman, 1910

8. *Haplophragmoides pusillus* sp. nov.

Pl. 1, figs. 2a-b

?*Haplophragmium canariense* (d'Orbigny). Chapman 1909, p. 126.

Test minute, planispiral, somewhat compressed, slightly evolute with depressed umbilicus, periphery rounded and lobulate. Chambers inflated with depressed sutures, six in the last whorl, increasing in both size and inflation. Aperture simple, arcuate, peripheral, with slight lip. Wall thin, composed of sand grains of varying size with minimal cement, surface slightly rough.

Holotype from 12-110, Reg. No. G2114. Max. diam. 0.35 mm, thickness 0.14 mm.

This species has points of resemblance to *Haplophragmoides canariense* (d'Orbigny) but is much smaller, averaging 0.27 mm in diameter and is rather more compressed, with fewer chambers to the whorl and more rapid increase in size of the later chambers. It is

probably Chapman's "small compressed form" of *H. canariense* recorded from Beaumaris, Port Phillip.

It has a wide but discontinuous distribution: N. Bay Areas 6, 12; W. Bay 16, 18, 26-28, 30; S.W. and Lower Bay 36, 54-55, 61-62, 68. It was very common in Areas 12 and 55, common in Area 28, otherwise rare to very rare. It was not found at any Bass Strait station.

Subfamily LITUOLINAE

Genus *AMMOBACULITES* Cushman, 1910

9. *Ammobaculites? barwonensis* sp. nov.

Pl. 1, figs. 3a-b

Test small, agglutinated, early portion spirally coiled and involute, with depressed umbilicus and slightly depressed sutures, consisting of about eight visible chambers. Later portion consists of up to five broad, low chambers, sub-circular in section and added in a rectilinear series, with slightly depressed sutures. Distal end flat or slightly convex, with no definite aperture. Wall thin, composed of sand grains of varying size, surface rough, chambers simple, not labyrinthic.

Holotype from 56-C9, Barwon estuary. Reg. No. G2115. Length 0.43 mm, diameter of spiral portion 0.29 mm, thickness 0.21 mm.

This small species is referred with some doubt to *Ammobaculites*, because of the absence of a definite terminal aperture. It is possible that minute interspaces between grains on the distal face function as such. Found at the type locality only.

10. *Ammobaculites exiguus* Cushman and Bronniman

Ammobaculites exiguus Cushman and Bronniman, 1948, p. 38, pl. 7, figs. 7-8; Hedley, Hurdle and Burnett, 1967, p. 19, pl. 5, figs. 5a-b.

Common at Swan Bay (49) and occasionally found in littoral collections from the W. coast of Port Phillip. Described from shallow water in the West Indies, it is recorded from the *Corallina officinalis* zone on the New Zealand coast (Hedley et al.). Distribution: 5, 10, 26, 49.

Genus *AMMOTIUM* Loeblich and Tappan, 1953

11. *Ammotium australiensis* (Collins)

Ammomarginulina australiensis Collins, 1958, p. 351, pl. 1, figs. 10a-b (non *Ammomarginulina* Wiesner, 1931).

This species was described from the Great Barrier Reef and noted at the time as occurring in Corio Bay. Further consideration of its generic position suggests that it should be placed in *Ammotium*. In nearly all specimens the final chamber reaches back to the spiral portion of the test, and only very occasionally is a quasi-uniserial chamber added as figured by Collins (loc. cit.). It differs from *A. cassis* in the compression of the later part of the test, resulting in a slit-like rather than a rounded terminal aperture. Distribution: 17, 25-27, 39-40, 42, 49-50, 67. Common in Corio Bay and Swan Bay in shallow muddy conditions.

Figured specimen from 26-C3, Reg. No. G2116. Length 0.90 mm, breadth 0.50 mm, thickness 0.27 mm.

Family TEXTULARIIDAE

Subfamily SPIROPLECTAMMININAE

Genus SPIROPLECTAMMINA Cushman, 1927

12. *Spiroplectammina atrata* (Cushman)

Textularina sagittula DeFrance, var. *atrata* Cushman, 1910 etc. (1911), p. 7, text-figs. 2-5; Albani 1968, p. 96, pl. 7, fig. 6.
T. sagittula DeFrance. Chapman 1941, p. 192; Collins 1953, p. 97.

This compressed and comparatively sharp-edged form, with sutures usually outlined in dark material, is that which has generally been recorded in local studies as *T. sagittula* DeFrance. The writer has examined a slide labelled as of this species and mounted by the late W. J. Parr from 'Endeavour' station 3918, from which it was recorded by Chapman (1941) with the following comments "This species is common on the Australian coast . . . In the previous material from the 'Endeavour' it was recorded as *Spiroplecta sagittula*."

Loeblich and Tappan (1964, p. C253) state that *T. sagittula* DeFrance, the type species of the genus *Textularia* from the Pliocene of Italy, is a large (up to 3 mm) elongated textularian of approximately circular cross-section

and biserial throughout. Their definition of the genus and of the subfamily Textulariinae excludes other than biserial forms.

The present form is comparatively small (length 0.5-0.7 mm), compressed, sharp-edged and in the majority of specimens has an initial spiral stage of 3-4 chambers after the proloculus, as illustrated by Cushman (ibid.). In short, it bears no relationship to *T. sagittula* of DeFrance as now understood, though in general form it resembles "*T. sagittula*" of Brady (1884) and later authors.

The writer agrees with Albani (1968) in referring it to Cushman's variety *atrata*, but considers that it cannot be regarded as a subspecies of *T. sagittula*, nor indeed as a *Textularia*. In the series from 'Endeavour' station 3918 referred to above, three specimens are sharp-ended and apparently biserial throughout. The remaining 14 specimens and most of those examined from the present material have a rounded aboral end and a spiral initial stage. It is therefore considered that Cushman's variety *atrata* should be given specific rank and transferred to the genus *Spiroplectammina* Cushman.

Distribution: 50, 56, 58, 60-62, 66, 68-69.

Subfamily TEXTULARIINAE

Genus TEXTULARIA DeFrance, 1824

13. *Textularia pseudogramen* Chapman and Parr

Textularia pseudogramen Chapman and Parr 1937, p. 153; Parr 1945, p. 194; 1950, p. 275.

This common Bass Strait species is found also in the Lower Bay. Distribution: 50, 56, 58-62, 68-69.

14. *Textularia australis* Parr

Textularia australis Parr, 1950, p. 275, pl. iv, figs. 30a-c.

Described from off Albany, W. Aust., and noted by Parr as occurring at Raine Is. and on the E. Australian coast, this species is not uncommon in Lower Bay and Bass Strait stations. Distribution: 50, 56, 59, 61-62, 66-68.

15. *Textularia kerimbaensis* Said

Textularia kerimbaensis Said, 1949, p. 6, pl. 1, fig. 8; Collins 1958, p. 353.

This species is widely distributed in the Indo-Pacific area. Local specimens tend to be rather more smoothly finished than tropical ones, but are otherwise conspecific. Restricted to Bass Strait and the Lower Bay.

Distribution: 50, 56, 58-62, 66-69.

16. *Textularia tenuissima* Earland

Textularia tenuissima Earland, 1933, p. 95, pl. iii, figs. 21-30; Chapman and Parr 1937, p. 151, pl. x, fig. 43; Parr 1950, p. 92.

Specimens referable to this cosmopolitan species were present but rare at four stations on the W. and S. coasts of Port Phillip. They were compared with specimens in the Parr collection from the Antarctic and S.W. Ireland and are considered to be conspecific, though not reaching the same degree of development in length and in number of chambers.

Distribution: 5, 27, 40, 68.

Family TROCHAMMINIDAE

Subfamily TROCHAMMININAE

Genus TROCHAMMINA Parker and Jones, 1859

17. *Trochammina inflata* (Montagu)

Nautilus inflatus Montagu, 1808, p. 81, pl. xviii, fig. 3. *Trochammina inflata* (Montagu). Brady 1884, p. 338, pl. xli, fig. 4; Parr 1945, p. 194, pl. viii, figs. 4a-b; Albani 1968, p. 96, pl. 7, figs. 3-5.

Recorded by Parr from the mouth of the Barwon River (56-C8), it has not been found at this locality in the present collections, nor does it normally occur in clean sandy beach deposits. However, it is abundant on the mud-flats higher up the river (56-C9), together with other arenaceous species of brackish-water provenance, and is obviously tolerant of low salinities, as noted by both Parr and Albani.

In the present material it occurs in shore collections made on the muddy W. littoral of Port Phillip and in Swan Bay, the exception being a single specimen from a depth of 9 m E. of Point Henry (38). In none of these localities is there any appreciable freshwater influence, being coastal rather than estuarine.

The present evidence suggests that *T. inflata* is adapted for life in a shallow, muddy inshore environment, and is also tolerant of low salinity where a suitable substrate occurs. This agrees with Brady's observations (1884, p. 339) on its distribution around the English coast. Its habitat preference may relate to the availability of the silt-size particles with which it constructs its particularly fine-grained test.

Distribution: 5, 16, 26, 38, 49, 56.

18. *Trochammina tasmanica* Parr

Trochammina tasmanica Parr, 1950, p. 279, pl. v, figs. 18a-c.

A few specimens were found in the Lower Bay and outside the Heads. The species was described from off Tasmania.

Distribution: 55-56, 66, 68.

19. *Trochammina appressa* Parr

Trochammina appressa Parr, 1950, p. 277, pl. v, figs. 6-7a-b.

Three specimens of this small scale-like species were found at Barwon Heads (56-C8). It was described from off the E. coast of Tasmania.

20. *Trochammina bartrumi* Hedley, Hurdle and Burnett

Trochammina bartrumi Hedley, Hurdle and Burnett, 1967, p. 21, text-figs. 9-10, pl. 6, figs. 2a-c.

Specimens having a stellate umbilicus, sigmoid ventral sutures and interio-marginal extra-umbilical—umbilical aperture are referred to this species, described from the North Island of New Zealand.

Distribution: 16-17, 30-31, 61-62, 68.

21. *Trochammina* sp. A

Pl. 1, figs. 5a-c

Reg. No. G2117. Two specimens from 56-C8 which did not appear to belong to any described species, and possibly not in this genus, are described and figured for the record, under open nomenclature.

Test trochospiral in the early stages, last chamber added on the opposite side of the test, with four chambers in the last whorl.

Dorsal side nearly flat, all chambers visible, sutures recurved and slightly depressed, periphery lobulate. Ventral side shows only the last whorl, with depressed umbilicus, ventricose chambers and radial depressed sutures. Aperture umbilical with small lip. Wall thin, rigid, pseudo-chitinous with a thin layer of fine sand grains and short lengths of sponge spicule.

This form may be compared with *T. alternans* Earland (1934, p. 103, p. iii, figs. 24-27) which however has fewer and more inflated chambers, takes on the alternating character earlier and is a deep-water species. The development of an alternating growth series would appear to justify separation of these two species from *Trochammina* s. str., but material at present available is insufficient for a full diagnosis.

22. *Trochammina ochracea* (Williamson)

Rotalina ochracea Williamson 1858, p. 55, pl. iv, fig. 112, pl. v, fig. 113.

Trochammina ochracea (Williamson). Balkwill and Millett 1884, p. 25, pl. 1, fig. 7; Heron-Allen and Earland 1932, p. 344.

Minute (0.3 mm diam.) depressed coneavo-convex specimens having a pseudo-chitinous ventral wall with recurved and somewhat sigmoid raised sutures, which appear light-coloured in contrast with the dark brown of the chamber wall, are referred to this species, which is cosmopolitan in distribution. It occurs rarely at a few stations in the Inner and Lower Bay—Areas 13, 61 and 68.

Subfamily REMANEICINAE

Genus REMANEICA Rhumbler, 1938

23. *Remaneica plicata* (Terquem)

Patellina plicata Terquem, 1875 etc. (1876), p. 72, pl. viii, fig. 9.

Trochammina plicata of authors.

Remaneica plicata (Terquem). Rhumbler 1938.

R. aff. plicata (Terquem). Collins 1958, p. 354.

Three specimens from the Lower Bay and several from the Barwon estuary are referred to this species, in which the plications are much more developed than in the genotype *R. helgolandica*. The specimens from the Barrier Reef

listed by the writer (loc. cit.) are now considered to belong in this species.

Distribution: 56, 61-62.

Family ATAXOPHRAGMIDAE

Subfamily VERNEUILININAE

Genus GAUDRYINA d'Orbigny, 1839

24. *Gaudryina convexa* (Karrer)

Textilaria convexa Karrer, 1865, p. 78, pl. 16, figs. 8a-e.

Gaudryina convexa (Karrer). Burdett, Hedley, Hornibrook and Hurley 1963, p. 516 *et seq.*

Gaudryina hastata Parr 1932, p. 219, pl. 22, figs. 40a-b.

G. (Pseudogaudryina) hastata Parr 1945, p. 195.

Burdett et al. have shown that Parr's species falls within the limits of variation of *G. convexa*, which has a wide distribution in the S.W. Pacific. In the present collections it is confined to the Lower Bay and stations outside the Heads, where it is fairly common.

Distribution: 50, 56, 58-59, 61-62, 66, 68.

Subfamily VALVULININAE

Genus CLAVULINA d'Orbigny, 1826

25. *Clavulina multicamerata* Chapman

Clavulina parisiensis d'Orbigny var. *multicamerata* Chapman, 1909, p. 127, pl. lx, fig. 5.

C. multicamerata Chapman. Parr 1932, p. 4, pl. 1, figs. 4-5; 1945, p. 194.

The records of this species have all been from shallow water on the Victorian coast. It is fairly common in Lower Bay stations and occurs also on the W. littoral at Kirk Point and Avalon, and in Bass Strait stations.

Distribution: 16, 26, 50, 56, 58-62, 69.

26. *Clavulina difformis* Brady

Clavulina angularis d'Orbigny var. *difformis* Brady, 1884, p. 396, pl. xlviii, figs. 25-31.

Clavulina difformis Brady. Cushman 1924, p. 23, pl. vi, figs. 5-6; Parr 1932, p. 5, pl. 1, figs. 5-6.

This species is comparatively rare in Victorian waters, though common further W. in St. Vincent Gulf, S. Aust. Single specimens were found at two stations, 56-C8 and 62-96.

Genus MARTINOTTIELLA Cushman, 1933

27. *Martinottiella primaeva* (Cushman)

Clavulina primaeva Cushman 1910 etc. (1913), p. 635, pl. lxxx, figs. 4-5.

Sclenkiella primaeva (Cushman). Parr, 1950, p. 283.

Martinottiella primaeva (Cushman). Loeblich and Tappan 1964, p. C282, fig. 188, 11.

This Pacific species was recorded by Parr from off Tasmania. Three specimens were found, only one developing a full uniserial stage.

Distribution: 61, 66, 68.

Suborder MILIOLINA

Superfamily MILIOLACEA

Family FISCHERINIDAE

Subfamily CYCLOGYRINAE

Genus CYCLOGYRA Woods, 1842

28. *Cyclogyra planorbis* (Schultze)

Cornuspira planorbis Schultze, 1854, p. 40, pl. 2, fig. 21.

Cyclogyra planorbis (Schultze). Loeblich and Tappan 1964, p. C438, fig. 392, 2.

A small (0.20-0.25 mm) semi-translucent *Cyclogyra* with rounded periphery, consisting of a proloculus and 3-5 whorls is referred to this species which was described from the Gulf of Mexico. It has a fairly general distribution in the Survey area, but is nowhere common. Similar specimens have been collected by the writer in beach sands from Noumea and the New Hebrides. Brady (1884, pl. xi, fig. 3 only) under the name of *Cornuspira involvens* Reuss has figured a very similar form which (Nuttall 1927) was derived from Kerguelen Is. *Cyclogyra involvens*, however, is a much larger species with many more whorls and a squarish periphery.

This species appears to have a wide distribution in the Pacific, which would probably be extended if older records of *C. involvens* were to be critically examined. The writer's record of *C. involvens* from the Great Barrier Reef probably refers to this species, as it was noted that specimens were small with 4-5 convolutions.

Distribution: 2, 5-6, 17, 26-28, 49-50, 56, 61-62, 66, 68.

Subfamily FISCHERININAE

Genus FISCHERINELLA Loeblich and Tappan, 1962

29. *Fischerinella helix* (Heron-Allen and Earland)

Fischerina helix Heron-Allen and Earland, 1914 etc. (1915), p. 591, pl. xlv, figs. 10-14.

Fischerinella helix (Heron-Allen and Earland). Loeblich and Tappan, 1962, p. 108.

Four specimens were found at 56-C8 and one at 58-C7. This species was described from the coast of East Africa, and the writer has collected it from beach sand, Tanna, New Hebrides. In common with some other references herein, it may represent a relict tropical element still existing in the local fauna.

Family NUBECULARIIDAE

Subfamily NUBECULARIINAE

Genus NUBECULARIA Defrance, 1825

30. *Nubecularia lucifuga* Defrance

Nubecularia lucifuga Defrance, 1820 etc. (1825), p. 210, pl. xlv, fig. 3; Brady 1884, p. 134, pl. i, figs. 9-16; Parr 1945, p. 13.

A few specimens only. Except for one specimen from Avalon Beach (26-C3), all were from the Lower Bay or outside the Heads.

Distribution: 26, 49-50, 56, 58, 61.

Subfamily OPTHALMIDIINAE

Genus OPTHALMIDIUM Kübler and Zwingli, 1870

31. *Ophthalmidium circularis* (Chapman)

Spiroloculina dorsata Reuss var. *circularis* Chapman, 1915, p. 7, pl. 1, fig. 1.

Ophthalmidium circularis (Chapman). Chapman 1941, p. 186; Parr 1950, p. 286, pl. v, fig. 30.

This species occurs only in the Lower Bay and Bass Strait stations.

Distribution: 50, 56, 58, 61, 66, 68.

Subfamily SPIROLOCULININAE

Genus SPIROLOCULINA d'Orbigny, 1826

32. *Spiroloculina sublimbata* Parr

Spiroloculina sublimbata Parr, 1950, p. 291, pl. vi, figs. 14a-c.

Common in the Lower Bay and Bass Strait stations, but not found further N. in Port Phillip.

Distribution: 50, 56, 58-62, 68-69.

33. *Spiroloculina angusteoralis* Parr

Spiroloculina angusteoralis Parr, 1950, p. 292, pl. vi, figs. 15a-c.

Rare in the Survey collections, being found at only four stations in Bass Strait and the Lower Bay.

Distribution: 56, 58, 61, 68.

34. *Spiroloculina disparilis* Terquem

Spiroloculina disparilis Terquem, 1878, p. 55, pl. 5 (10), fig. 12; Cushman and Todd 1944, p. 35, pl. 5, figs. 22-31.

S. affixa Terquem. Parr 1950, p. 291.

Two specimens, one from 56-C8 and one from 68-157. The species ranges from the Tertiary in Victoria to the Holocene, mostly in lower latitudes, though it has been recorded by Parr (as *S. affixa*) from off Tasmania.

35. *Spiroloculina antillarum* d'Orbigny

Spiroloculina antillarum d'Orbigny, 1839A, p. 166, pl. ix, figs. 3-4; Parr 1932, p. 9, pl. 1, fig. 11; Albani 1968, p. 97, pl. 7.

Parr (1932) recorded and figured *S. antillarum* from Glenelg, S. Aust. This is the common costate *Spiroloculina* of sheltered waters on the southern Australian coast, and in the present collections was found in numbers in W. Bay stations from Altona (Area 5) to Point Lonsdale, and also in the Lower Bay, with a few specimens from Bass Strait stations.

Cushman and Todd (1944), in a revision of the genus *Spiroloculina*, figured three Holocene costate species with rounded periphery, *S. antillarum* from the Caribbean and two new species, *S. scita* and *S. corrugata* from the Indo-Pacific. *S. scita*, with holotype from Samoa, was recorded from a number of S. Australian localities, and Parr's fig. 11 was copied as an additional illustration of the species. Parr noted that his specimen was exceptionally broad, and this was one of the characteristics noted for the new species.

Sixteen specimens from Parr's original Glenelg material were studied and measured for comparison with descriptions and figures of the three species mentioned above, and with specimens of *S. antillarum* from Cuba and the Dry Tortugas (type region). They were found to vary widely in all the characteristics used

by Cushman and Todd to differentiate the species i.e. size, length/breadth ratio, obliquity of costae and the presence of a definite neck.

Specimens could be selected which could without difficulty be assigned to each of the three species; smaller specimens with parallel costae to *S. antillarum*, larger and broader specimens with oblique costae to *S. scita*, and even larger but proportionately narrower specimens to *S. corrugata*, with intermediate combinations of characters.

As they obviously represent a single variable population, it seems best to use the prior name of *S. antillarum* for the local costate species, though local specimens are noticeably larger than Caribbean specimens (mean length 1.16 mm as against 0.96 mm, the latter figure derived from maximum and minimum lengths given by Cushman and Todd). This may be due to the unfavourable effect of cooler conditions on reproduction, resulting in increased growth before this takes place, as reported for other foraminiferal species (Loeblich and Tappan 1964, p. C125).

Distribution: 5, 9, 16, 26-27, 30-31, 39, 42, 49-50, 56, 58, 61-62, 67-68.

36. *Spiroloculina communis* Cushman and Todd

Spiroloculina communis Cushman and Todd, 1944, p. 63, pl. 9, figs. 4-5, 7-8.

Except for two doubtful juveniles from Avalon Beach (26) this species is confined to Lower Bay and Bass Strait stations and is nowhere common. The authors record it from the E. coast of Australia.

Distribution: 26, 50, 56, 58, 61, 67.

37. *Spiroloculina lucida* Cushman and Todd

Spiroloculina lucida Cushman and Todd, 1944, p. 70, pl. 9, figs. 30-31; Albani 1968, p. 17, pl. 7, fig. 15.

One specimen from 50-266 has the characteristic convex periphery of this species. It has been recorded several times from the E. coast.

38. *Spiroloculina aequa* Cushman

Spiroloculina antillarum d'Orbigny var. *aequa* Cushman, 1932 etc. (1932), p. 40, pl. 10, figs. 4-5. *S. aequa* Cushman. Cushman and Todd 1944, p. 59, pl. 8, figs. 13-15.

A few specimens from 56-C8 are referable to this species, which was described from the Paumotus.

Genus PLANISPIRINOIDES Parr, 1950

39. *Planispirinoides bucculentus* (Brady)

Miliolina bucculenta Brady, 1884, p. 170, pl. cxiv, fig. 3.

Planispirinoides bucculentus (Brady), Parr 1950, p. 287, pl. vi, figs. 1-6, text-figs. 1-5.

Small specimens were found at a number of stations on the Bass Strait coast and the Lower Bay. Parr recorded it from Barwon Heads and also from the Antarctic, where it attains a much larger size.

Distribution: 43, 50, 56, 58-61, 66, 68-69.

Subfamily NODOBACULARIINAE

Genus VERTEBRALINA d'Orbigny, 1826

40. *Vertebralina striata* d'Orbigny

Vertebralina striata d'Orbigny, 1826, p. 283, No. 1, Modèle 81; Chapman 1909, p. 125; Parr 1943, p. 21.

Fairly common on the W. coast, in Corio Bay and Swan Bay, and occurs rarely in the Lower Bay off Rye. Chapman reported it as rare at Beaumaris, and Parr recorded it from Westernport and Spencer Gulf, S. Aust. It was not found outside the Heads, its habitat locally being shallow water in sheltered localities.

Distribution: 5, 26, 28, 39, 49-50, 61, 68.

Family MILIOLIDAE

Subfamily QUINQUELOCULININAE

Genus QUINQUELOCULINA d'Orbigny, 1826

41. *Quinqueloculina baragwanathi* Parr

Quinqueloculina baragwanathi Parr, 1945, p. 196, pl. viii, figs. 6a-c, pl. xii, fig. 3; Albani 1968, p. 98, pl. 7, figs. 16-17.

Common on the Bass Strait coast, penetrating the Lower Bay to a limited extent, and also occurring in Swan Bay. It has a considerable range to the NE. Albani (*loc. cit.*) reports it from Port Hacking, N.S.W., Parr mentions its occurrence at Noumea, and the writer has collected typical specimens from beach sand, Tanna, New Hebrides.

Distribution: 49-50, 56, 58, 59, 61, 66-68.

42. *Quinqueloculina subpolygona* Parr

Quinqueloculina subpolygona Parr, 1945, p. 196, pl. xii, figs. 2a-c; Albani 1968, p. 99, pl. 7, figs. 12-14.

Described from Barwon Heads (56), this species is common in Victorian coastal waters and persists as far N. as Port Hacking (Albani). In Port Phillip it is common in the Lower Bay and the W. coastline as far N. as Altona. Specimens from shallow muddy habitats are somewhat larger than those from the open coast and show a tendency toward irregular growth.

Distribution: 5, 9, 16, 26-28, 31, 42-43, 49-50, 56, 58-62, 67-69.

43. *Quinqueloculina bradyana* Cushman

Miliolina undosa Chapman (non Karrer), 1909, p. 24. *Quinqueloculina bradyana* Cushman, 1910 etc. (1917), p. 52, pl. xviii, fig. 2; Parr 1950, p. 290, pl. vi, fig. 11.

Common in Bass Strait stations and in the Lower Bay, it persists on the SW. coast as far as Indented Head, but does not penetrate into Swan Bay or the W. Bay generally.

Distribution: 42-43, 50, 56, 58-62, 66-69.

44. *Quinqueloculina poeyana* d'Orbigny

Quinqueloculina poeyana d'Orbigny, 1839A, p. 191, pl. 11, figs. 25-27; Parker, Phleger and Peirson 1953, p. 12, pl. 2, figs. 13-14; Parr 1950, p. 290.

Specimens closely similar to others from the Caribbean (type region) are common on the W. littoral between Altona and Swan Bay, with off-shore records from Corio Bay, Geelong Outer Harbour and the Lower Bay. It also occurs commonly in the upper reaches of the Barwon estuary (56-C9), and rarely at the mouth.

It is distinguished by its slenderness (average of 12 specimens giving a length/breadth ratio of 2.15:1), its compact overlapping chambers, produced neck and circular aperture with small tooth. *Q. costata* d'Orbigny (now re-named *Q. tenagos* Parker 1962) was recorded locally by Parr (1932), but this has a proportionately broader and flatter test (Albani 1968, pl. 7, figs. 22-23, and Hedley et al. 1967, pl. 9, fig. 1). It has not been found in the present collections.

Locally, this is a stillwater species, best represented on the W. littoral, and intergrading with the subspecies described below in the Areas near the Heads.

Distribution: 5, 9-10, 16, 26-27, 30-31, 42, 49-50, 56, 60-63, 66, 68-69.

45. *Quinqueloculina poeyana* d'Orbigny
victoriensis subsp. nov.

Pl. 1, figs. 6a-b

Test quinqueloculine, slender, costate, chambers narrow, rounded and projecting to give the test an angular appearance, aperture narrow, parallel-sided, without neck and almost filled by a long straight tooth. It differs from *Q. poeyana* s. str. in having narrower and more projecting chambers and in its distinctive apertural characteristics.

Holotype from 58-C7, Reg. No. G2118. Length 0.57 mm, breadth 0.24 mm, thickness 0.20 mm.

This form was first noted in material from the Lower Pleistocene (Werrikoo Member) of the Glenelg River, W. Vict., in a facies generally similar to that of shallow-water Holocene deposits on the Victorian coastline. It occurs in Bass Strait stations in the present collections, and penetrates into the Lower Bay, where intermediate forms with a loop-shaped aperture are found, together with typical specimens of *Q. poeyana*.

It is characteristic of a high-energy coastline, just as *Q. poeyana* is locally characteristic of low-energy sheltered waters, and apparently has existed in similar environments through the Pleistocene. The existence of intermediate forms in the lower part of Port Phillip, where Bass Strait influence is strong, suggests that the two forms are insufficiently differentiated to justify specific separation, though the morphology of open-coast specimens would otherwise warrant this.

It may be noted that Parr's illustration (1932) of '*Q. costata* d'Orbigny' from San Remo, near the entrance to Westernport, probably refers to this species, as far as can be judged from the apertural characteristics as seen in side view.

Distribution: 43, 50, 56, 58, 60.

46. *Quinqueloculina moynensis* Collins

Quinqueloculina moynensis Collins, 1953, p. 98, pl. 1, figs. 1a-c; Albani 1968, p. 100.

Since describing this species from the Pleistocene of Port Fairy, Vict., it has been found to be common in Bass Strait beach sands. In the present collections it ranges into the Lower Bay but no further. Recent specimens vary in the degree of striation, some being quite smooth, the majority finely striated on all chambers. This characteristic was not mentioned in the original description, but the figured specimen shows some striation on the penultimate chamber.

Distribution: 43, 50, 56, 58-62, 66-69.

47. *Quinqueloculina lamarckiana* d'Orbigny

Quinqueloculina lamarckiana d'Orbigny, 1839A, p. 189, pl. 11, figs. 14-15; Parr 1945, p. 196.

Small, sub-circular quinqueloculines with angular periphery are referred with some doubt to this widely recorded species. They are generally distributed in the W. and S. Areas of Port Phillip and also in Bass Strait stations.

Distribution: 5, 9, 16, 26, 28, 30-32, 49-50, 56, 58-59, 61-62, 66-68.

48. *Quinqueloculina seminulum* (Linne)

Serpula seminulum Linne, 1767, p. 1264, No. 791.

Quinqueloculina seminulum (Linne). d'Orbigny 1826 p. 303, No. 44; Chapman 1909, p. 123 (as *Milolina*).

This cosmopolitan species is widely distributed within Port Phillip except for the deeper waters of the central basin. Chapman recorded it from Beaumaris. It was not found outside Port Phillip Heads.

Distribution: 3, 5, 7, 10, 13, 16-18, 26-27, 30-31, 36, 38-40, 49-50, 63, 67.

49. *Quinqueloculina quinquecarinata*
Collins

Quinqueloculina quinquecarinata Collins, 1953, p. 360, pl. ii, figs. 8a-c.

One specimen of this small but distinctive species was found at Barwon Heads (56-C8). It was described from the Pleistocene of Port Fairy in an assemblage characteristic of open-coast conditions, and has apparently survived into the Holocene in a similar environment.

50. **Quinqueloculina anguina arenata** Said

Quinqueloculina anguina (Terquem) var. *arenata* Said, 1949, p. 9, pl. 1, fig. 25.
Q. anguina (Terquem) var. *wiesneri* Parr, 1950, p. 290, pl. iv, figs. 9-10.
Q. anguina arenata Said. Collins 1958, p. 358; Albani 1968, p. 98.

This species has a wide distribution in the Indo-Pacific, ranging from the Red Sea to Tasmania. Specimens were found only in Bass Strait and Lower Bay stations.
 Distribution: 56, 58, 61, 68.

51. **Quinqueloculina vulgaris** d'Orbigny

Quinqueloculina vulgaris d'Orbigny, 1826, p. 302, No. 33; Cushman 1921, p. 417, pl. 87, figs. 1a-c.

A more or less circular quinqueloculine with sub-angular periphery and loop-shaped aperture with simple tooth is referred to this species which has been recorded from the Indo-Pacific and New Zealand. Rare at Barwon Heads (56-C8).

Genus MASSILINA Schlumberger, 1893

52. **Massilina ammophila** (Parr)

Quinqueloculina ammophila Parr, 1932, p. 8, pl. 1, fig. 10, text-fig. 1E.
Massilina ammophila (Parr). Parr 1950, p. 292, pl. vi, fig. 16.

This species, described from Westernport, is confined to the Lower Bay, where it occurs in some numbers off Rye and near Swan Is.
 Distribution: 50, 61-62, 67-68.

Genus PYRGO Defrance, 1824

53. **Pyrgo denticulata** (Brady)

Biloculina ringens Lamarck var. *denticulata* Brady, 1884, p. 143, pl. 3, figs. 4-5.
Pyrgo denticulata (Brady). Cushman 1918 etc. (1929), p. 69, pl. 18, figs. 3-4; Parr 1950, p. 296.

Common in Bass Strait shore sands and in the Lower Bay, but not elsewhere. Specimens are smaller than tropical specimens, and rarely show any signs of denticulation.
 Distribution: 43, 50-51, 56, 58-62, 66, 68.

Genus SIGMOILINA Schlumberger 1887

54. **Sigmoilina australis** (Parr)

Quinqueloculina australis Parr, 1932, p. 7, pl. 1, figs. 8a-c.
Sigmoilina australis (Parr). Parr 1945, p. 197.

Common in Bass Strait stations and rare in limited areas of the Lower Bay.
 Distribution: 50, 56, 58, 66, 68.

Genus SIGMOILOPSIS Finlay, 1947

55. **Sigmoilopsis sabulosa** (Parr)

Sigmoilina sabulosa Parr, 1950, p. 292, pl. vi, figs. 17a-c.

A few specimens from several stations in the Lower Bay and one from outside the Heads (66). As this species has an agglutinated test, it is transferred to *Sigmoilopsis* Finlay.
 Distribution: 62, 66, 68.

Genus TRILOCULINA d'Orbigny, 1826

56. **Triloculina trigonula** (Lamarck)

Miliolina trigonula Lamarck, 1804 etc. (1804), p. 351, No. 3.
Triloculina trigonula (Lamarck). d'Orbigny 1826, p. 299, No. 1, pl. 16, figs. 5-9; Parr 1945, p. 197.

Well developed within Port Phillip on the W. littoral and nearby dredge stations between Altona and Kirk Point, and from Indented Head to the Lower Bay and Bass Strait stations.
 Distribution: 5-6, 9-10, 16, 30-31, 42-43, 50-51, 56, 58-63, 67, 68-69.

57. **Triloculina striatotrigonula** Parker and Jones

Triloculina striatotrigonula Parker and Jones, 1865, p. 438 (nom. nud.); Parr 1941, p. 305.

This common open coast species penetrates the Lower Bay, but is not found further N. As Parker and Jones' reference was a nom. nud., this species should probably be attributed to Parr, who designated Brady's fig. 10 (1884, pl. iv) as the holotype. However, he considered that the specific name was sufficiently descriptive in all the circumstances and accordingly retained the original authorship. His usage has been followed here.

Distribution: 43, 50, 56, 58-62, 66, 68-69.

58. **Triloculina bertheliniana** (Brady)

Miliolina bertheliniana Brady, 1884; p. 166, pl. cxiv, fig. 2.
Triloculina bertheliniana (Brady). Parr 1932, p. 10, fig. 13.

Most of the records of this reticulated species are from the Tropical Indo-Pacific, but Parr recorded it from shore sand at Torquay, Vict., and one specimen was found at Barwon Heads (56-C8).

59. *Triloculina oblonga* (Montagu)

Vermiculum oblongum Montagu, 1803, p. 522, pl. xiv, fig. 9.

Triloculina oblonga (Montagu). Parr 1932, p. 10, pl. 1, figs. 15a-c; 1945, p. 198.

Common in most Areas where miliolines were found, including the Inner Bay, Lower Bay and Bass Strait.

Distribution: 5, 9-10, 13, 16-17, 26-28, 30-31, 40, 42-43, 48-50, 56, 58-63, 67-69.

60. *Triloculina sabulosa* sp. nov.

Pl. 1, figs. 7a-b

Test small, triloculine, surface agglutinated with much calcareous cement and occasional grains of quartz or heavy minerals which are large in proportion to the size of the test, giving it an irregular outline. Average length 0.35 mm, length/breadth ratio 1.84:1. Aperture rounded on a short produced neck, with a very small tooth discernible in only a few specimens. *Holotype* from 56-C8, Reg. No. G2119. Length 0.43 mm, breadth 0.23 mm, thickness 0.18 mm.

15 specimens were found at Barwon Heads (56-C8) and one at 61-240 in the Lower Bay. The figured specimen somewhat resembles Parr's original figure (1932, pl. 1, fig. 10) of '*Quinqueloculina*' *ammophila* (*Massilina*, vide supra), but the latter species is much larger by a factor of three, its juvenile specimens are quinqueloculine, and it has been found only in the Lower Bay. This is one of the very few species of *Triloculina* to have an agglutinated test, and appears to be distinct from any described form.

Subfamily MILIOLINELLINAE

Genus MILIOLINELLA Wiesner, 1931

61. *Miliolinella subrotunda* (Montagu)

Vermiculum subrotundum Montagu, 1803, p. 521.

Triloculina subrotunda (Montagu). Parr 1950, p. 203.

Subcircular inflated specimens with a crescentic aperture partly filled by a flap-like tooth are referred to this species, the genotype of *Miliolinella*. They occur in Bass Strait stations and more rarely in the Lower Bay. This is probably the form recorded by Parr (1945) as *Triloculina circularis* Bornemann from Barwon Heads. He later (1950) recorded *T. subrotunda* from off Tasmania.

Distribution: 50, 56, 58, 60-61, 68.

62. *Miliolinella labiosa* (d'Orbigny)

Triloculina labiosa d'Orbigny, 1839A, p. 178, pl. x, figs. 12-14; Parr 1932, p. 220, pl. xxii, fig. 44; 1945, p. 198.

Common in Bass Strait material, occasional in Lower and Inner Bay stations. The wild-growing form which has been distinguished as var. *schaumlandi* is common at Barwon Heads but not elsewhere. Its status appears to be doubtful.

Distribution: 5, 10, 26-27, 30-31, 39, 49-50, 56, 58, 60, 66, 68.

Genus SCUTULORIS Loeblich and Tappan, 1953

63. *Scutuloris parri* sp. nov.

Pl. 1, figs. 8a-c

Test quinqueloculine, sub-oval in outline, somewhat compressed, later chambers overlapping at base, sutures indistinct. Wall thin, lumen of later chambers showing through as dark areas, polished and finely striate. Aperture crescentic with broad semicircular tooth of varying width.

Holotype from 58-C7, Reg. No. G2120. Length 0.48 mm, width 0.40 mm, thickness 0.25 mm.

This may be the form referred by Parr (1945, p. 198) to *Triloculina circularis* Bornemann var. *sublineata* Brady, mentioning its relative compression and 'large, flat, semicircular tooth', and suggesting that it may be a new species. Some specimens appear triloculine, but sectioning shows the quinqueloculine arrangement. Common in Bass Strait stations, and penetrating the Lower Bay to the same extent as many other open-water species.

Distribution: 43, 49-50, 56, 58-62, 66-69.

Family SORITIDAE

Subfamily PENEROPLINAE

Genus PENEROPLIS de Montfort, 1808

64. *Peneroplis planatus* (Fichtel and Moll)

Nautilus planatus var. β , Fichtel and Moll, 1798, p. 91, pl. xvi, figs. 1d-f.

Peneroplis planatus (Fichtel and Moll). d'Orbigny 1826, p. 285, Modèle No. 16; Parr 1945, p. 199.

One worn example from 50-266 and a worn juvenile test from 66-292. While this is an extremely common species in S. Aust. Gulf waters, it is open to doubt whether it survives as a living population in Port Phillip.

Suborder ROTALIINA

Superfamily NODOSARIACEA

Family NODOSARIIDAE

Subfamily NODOSARIINAE

Genus NODOSARIA Lamarck, 1812

65. *Nodosaria perversa* Schwager

Nodosaria perversa Schwager, 1866, p. 212, pl. v, fig. 29; Parr 1950, p. 331; Cushman and McCulloch 1950, p. 318, pl. 41, figs. 26-32.

Specimens of this delicately striate species were found only at three stations of Area 68, off Ryc. Some show an asymmetry of apertural position suggesting that it should be referred to *Dentalina*, but too few are available for any definite conclusion to be made.

Genus AMPHICORYNA Schlumberger, 1881

66. *Amphicoryna scalaris compacta* Parr

Amphicoryna scalaris (Batsch) var. *compacta* Parr, 1950, p. 328, pl. xi, fig. 24.

Common in Bass Strait beach sands and penetrating into the Lower Bay. This is the local form of *A. scalaris*, a cosmopolitan species.

Distribution: 50, 56, 58-59, 61, 68.

67. *Amphicoryna hirsuta* (d'Orbigny)

Nodosaria hirsuta d'Orbigny, 1826, p. 252.

Amphicoryna hirsuta (d'Orbigny), Parr 1950, p. 328.

This has much the same distribution as the previous species. Parr recorded it from off Tasmania.

Distribution: 50, 56, 58, 61, 68.

Genus ASTACOLUS de Montfort, 1808

68. *Astacolus bassensis* (Parr)

Vaginulina bassensis Parr, 1945, p. 200, pl. xii, figs. 4a-b.

Fairly common at Barwon Heads (56-C8) and other Bass Strait stations, with a few specimens from off Rye in the Lower Bay. The obliquity of sutures and curved axis of fully developed specimens places this species in *Astacolus* rather than *Vaginulina*, in which the later sutures are at right angles to the axis.

Distribution: 56, 58, 61, 66.

Genus DENTALINA Risso, 1826

69. *Dentalina guttifera* d'Orbigny

Dentalina guttifera d'Orbigny, 1846, p. 49, pl. ii, figs. 11-13.

Not uncommon in Bass Strait and Lower Bay stations, with occasional specimens from the W. Bay. Most specimens of this fragile species are broken and show only 2-3 chambers.

Distribution: 28, 30, 32, 56, 61, 66, 68.

70. *Dentalina mutsui* Hada

Dentalina mutsui Hada, 1931, p. 97, text-fig. 50; Parr 1945, p. 201, pl. xii, fig. 5; Albani 1968, p. 102.

Common in Bass Strait shore stations, occasional in the Lower Bay.

Distribution: 56, 58-59, 61.

71. *Dentalina subemaciata* Parr

Dentalina subemaciata Parr, 1950, p. 329, pl. xii, fig. 1.

Fragmentary tests consisting of the first 2-5 chambers, fairly common in Bass Strait shore stations and occasional in the Lower Bay, appear to belong to this species, a slender delicate form unlikely to survive unbroken in open beach conditions. Distribution: 56, 58, 61, 69.

Genus DIMORPHINA d'Orbigny, 1826

72. *Dimorphina* sp. A

Pl. 1, fig. 9

Test subcylindrical with broadly-rounded base and rather more tapering oral end. Specimen has a proloculus and four chambers, the

first three being loosely coiled and slightly compressed, becoming uniserial and circular in section in the last chamber, with a terminal radiate aperture. Surface finely perforate except for an area at the oral end, costate, with about 12 costae which are continuous over the slightly depressed sutures.

Figured specimen from Area 62, station 96. Reg. No. 2121. Length 0.70 mm, breadth 0.31 mm. Only one specimen was found. It appears to be a distinctive form, but in the absence of other examples is described and figured for the record under open nomenclature.

Genus FRONDICULARIA DeFrance, 1826

73. *Frondicularia compta villosa* Heron-Allen and Earland

Frondicularia compta Brady var. *villosa* Heron-Allen and Earland 1924, p. 157, pl. 10, figs. 54-55; Parr 1945, p. 201, pl. ix, fig. 4.

Seven specimens were found, all showing the punctae along the keeled periphery which was the basis for separation of Heron-Allen and Earland's variety described from the Victorian Miocene. As Brady's original specimen of *F. compta* was derived from Bass Strait (Nuttall 1927), it would be worth re-examination to see whether it carries these punctae, which in some specimens are quite obscure and likely to be overlooked.

Distribution: 56, 58, 61, 68.

Genus LAGENA Walker and Jacob, 1798

74. *Lagena sulcata* Walker and Jacob

Serpula (Lagena) sulcata Walker and Jacob, 1798, p. 634, pl. xiv, fig. 5.
Lagena sulcata Walker and Jacob Brady 1884, p. 462, pl. cvii, figs. 23, 26, 33-34; Parr 1945, p. 202; 1950, p. 301; Collins 1958, p. 379; Albani 1968, p. 103.

Common in Bass Strait and in the Lower Bay, with a few specimens from Area 30. Many forms have been referred to this cosmopolitan species. The present specimens have an ovate body with distinct extended neck, in some cases equal in length to the body. Costae are sharp, about 20 in number, and extend to the end of the neck, occasionally with a tendency to twist spirally.

Distribution: 30, 50, 56, 58-61, 66-68.

75. *Lagena striata* (d'Orbigny)

Oolina striata d'Orbigny, 1839C, p. 21, pl. v, fig. 12.
Lagena striata (d'Orbigny). Brady 1884, pl. cvii, figs. 22 etc.; Parr 1945, p. 202; Collins 1958, p. 379; Albani 1968, p. 103.

Flask-shaped specimens, finely striate, with the striations continued with a spiral twist along the neck, are referred to this species. They are common in Bass Strait and Lower Bay stations, with single specimens from a few Inner Bay stations.

Distribution: 5, 12, 28, 30, 32, 36, 49, 56, 61, 68.

76. *Lagena perlucida* (Montagu)

Vermiculum perlucidum Montagu, 1803, p. 525, pl. xiv, fig. 3.

Lagena perlucida (Montagu). Cushman and McCallloch 1950, p. 342, pl. 46, figs. 1-2 (gives earlier references); Parr 1945, p. 202; 1950, p. 300; Collins 1958, p. 379.

Rare specimens were found in a number of separated localities indicating a general distribution in Port Phillip and Bass Strait.

Distribution: 5, 28, 30, 32, 56, 68.

77. *Lagena crenata* Parker and Jones

Lagena crenata Parker and Jones, 1865, p. 420, pl. xviii, figs. 4a-b; Brady 1884, p. 467, pl. cvii, figs. 15, 21.

Rare in Bass Strait and Lower Bay stations, with one specimen from the Inner Bay. It was recorded by Brady from East Monocour Is., Bass Strait.

Distribution: 30, 50, 56, 60-61, 68.

78. *Lagena striatopunctata* Parker and Jones

Lagena sulcata d'Orbigny var. *striatopunctata* Parker and Jones, 1865, p. 350, pl. xiii, figs. 25-27.
Lagena striatopunctata Parker and Jones. Brady 1884, p. 468, pl. lviii, figs. 37, 40.

Two specimens only, from 56-C8 and 68-158. This species has been referred to *Oolina* by Loeblich and Tappan (1953, p. 72) because of the presence of an entosolenian tube, one of the characters which define the family Oolininae, including *Oolina* and *Fissurina*. Apart from this, it is a typical *Lagena*, with a flask-shaped test, produced neck and a simple aperture which is neither radiate nor fissurine.

Three other species recorded or described herein present similar anomalies in respect of the presence or absence of an entosolenian tube, as tabulated below:

TABLE 2

Species	Test form	Aperture	Ento. tube
<i>L. striatopunctata</i> P. and J.	Flask-shaped with pro- duced neck	simple	present
<i>L. ramulosa</i> Chapman	Pyriform	simple	present
<i>O. guttaformis</i> sp. nov.	Drop-shaped and globose	radiate	absent
<i>F. crassianulata</i> sp. nov.	Compressed and keeled	fissurine	absent

The above evidence, admittedly based on only a few species, suggests that the presence or absence of an entosolenian tube is not a consistent character at the generic level. The combinations listed do not fit the definitions of the genera cited, and could cause complications at the family level. However, the writer considers that generic placement should take into consideration all characteristics rather than depend on one apparently variable character, and has accordingly retained the present species in *Lagena*.

79. *Lagena spiralis* Brady

Lagena spiralis Brady, 1884, p. 408, pl. cxiv, fig. 9; Collins 1958, p. 379; Parr 1950, p. 301.

One specimen from Barwon Heads (56-C8). Parr recorded the species from off Tasmania, but the present specimen may possibly be derived, as the species is found in the Victorian Tertiary.

80. *Lagena distoma-margaritifera* Parker and Jones

Lagena distoma-margaritifera Parker and Jones 1865, p. 357, pl. xviii, figs. 6a-b; Parr 1932, p. 11, pl. i, figs. 16-17.

Common in Bass Strait beach sands, with a range extending well into the Lower Bay.

Distribution: 43, 50, 56, 58-62, 68.

81. *Lagena victoriensis* Parr

Lagena distoma-margaritifera Parker and Jones var. *victoriensis* Parr, 1945, p. 202, pl. xii, fig. 6; Collins 1953, p. 95.

L. distoma-margaritifera, as noted by Brady (1884, p. 459), is very variable in its surface ornament, ranging from bead-like protuberances to a network of low anastomosing ridges, with many intermediate forms. Parr's variety *victoriensis*, on the other hand, is constant in its characteristic ornament of strong rounded longitudinal costae, and was found only in Bass Strait stations (56, 58). Both forms are found in the Pleistocene of Port Fairy, an open coast facies. It is concluded that the two species are validly separated.

82. *Lagena flexa* Cushman and Gray

Lagena flexa Cushman and Gray, 1946, p. 68, pl. 12, figs. 18-21; Cushman and McCulloch 1950, p. 339, pl. 45, fig. 1.

Described from the Californian Pleistocene, the species has a Holocene Indo-Pacific distribution. Typical specimens were found in Areas 56, 58 and 68 (Bass Strait and Lower Bay).

83. *Lagena elongata* (Ehrenburg)

Miliola elongata Ehrenburg, 1854, p. 274, pl. 25, fig. 1.

Lagena elongata (Ehrenburg), Brady 1884, p. 457, pl. lxi, fig. 29; Cushman and McCulloch 1950, p. 338, pl. 44, fig. 14.

Rare at Barwon Heads (56-C8) and in Area 61 in the Lower Bay.

84. *Lagena chasteri* Millett

Lagena chasteri Millett, 1898 etc. (1901), p. 11, pl. i, fig. 11; Sidebottom 1912, p. 398, pl. 16, fig. 34.

Two specimens from Barwon Heads (56-C8) and two from Area 61 in the Lower Bay. They show the surface appearance described by Millett—a clear smooth surface layer with minute pores overlying an opaque, apparently vesicular inner layer, but are more globose in proportions, similar to Sidebottom's fig. 34.

85. *Lagena gracilis* Williamson

Lagena gracilis Williamson, 1848, p. 13, pl. i, fig. 15; Cushman 1932 etc. (1933), p. 33, pl. 8, figs. 5-7.

Slender fusiform costate specimens with bluntly-pointed aboral ends are referred to this species. They occur frequently in Bass Strait and Lower Bay stations.

Distribution: 43, 50, 56, 58-61, 66, 68.

86. *Lagena favoso-punctata* Brady

Lagena favoso-punctata Brady, 1881, p. 62; 1884, p. 473, pl. lviii, fig. 35, pl. lix, fig. 4, pl. lxi, fig. 2.

Specimens with an annulate neck similar to Brady's fig. 35 were common in Bass Strait beach sands and occasionally found in the Lower Bay. Described from Torres Strait, the species is found in the Victorian Tertiaries. Distribution: 50, 56, 58, 60-61, 68.

87. *Lagena implicata* Cushman and McCulloch

Lagena implicata Cushman and McCulloch, 1950, p. 340, pl. 45, figs. 5-7.

Four specimens from Barwon Heads (56-C8) are referable to this species which was described from off California.

88. *Lagena flatulenta* Loeblich and Tappan

Lagena flatulenta Loeblich and Tappan, 1953, p. 60, pl. 11, fig. 10; Albani 1968, p. 103.

Two specimens from Barwon Heads (56-C8) show the angular transition from the globular body to the elongate neck which characterizes this species.

89. *Lagena ramulosa* Chapman

Lagena acuticosta Reuss var. *ramulosa* Chapman, 1909, p. 129, pl. 9, fig. 9; Parr 1932, p. 11, pl. i, fig. 19; 1945 p. 202; Collins 1953, p. 95.

This is the commonest lagenid in Bass Strait shallow-water material and its range extends well into the Lower Bay, with occasional specimens from further N. Typical specimens occur in the Victorian Pleistocene.

Dissection has revealed the presence of a slender entosolenian tube which reaches nearly to the bottom of the lumen. Despite this, it appears to be much more closely related to other pyriform costate lagenids in which this feature has not been reported, such as *L. inepta* Cushman and McCulloch, than to *Oolina*. For reasons adduced earlier (see *L. striatopunctata*) it has been retained in *Lagena* and in view of its distinct characteristics has been raised to specific rank.

Distribution: 36, 43, 50, 56, 58-62, 66-68.

90. *Lagena bassensis* sp. nov.

Pl. 1, fig. 10

Test pyriform, circular in end view, surface ornamented by 18-22 rounded longitudinal costae, occasionally anastomosing toward the base where they meet in a small raised ring, and terminating under a conical cap-like neck which is solid, glassy and pierced by a narrow hole connecting the simple round aperture to the lumen. No entosolenian tube is present.

Holotype from 56-C8, Reg. No. G2122. Length 0.35 mm, breadth 0.22 mm.

Its closest congener appears to be *L. pseudo-sulcata* McLean from the Tertiary of North America. '*Oolina tasmanica* Parr has a row of circular pits around the base of the neck. No entosolenian tube is mentioned in the description of the latter species, its aperture is simple and it is probable that it should also be referred to *Lagena*. *L. bassensis* is a common species in Bass Strait stations and in the Lower Bay. Distribution: 50, 56, 58, 61, 68.

91. *Lagena nepeanensis* sp. nov.

Pl. 1, fig. 12

Test flask-shaped, polished, thin-walled and finely perforate, with a solid glassy neck through which can be seen a narrow hole leading from the simple aperture to the lumen. No entosolenian tube is present.

Holotype from 59-36, Reg. No. G2124. Length 0.38 mm, breadth 0.24 mm.

Common in Bass Strait and in the Lower Bay in the vicinity of Point Nepean, this species differs from *L. laevis* Montagu and *L. flatulenta* Loeblich and Tappan in possessing a solid plug-like neck rather than a slender phialine tube formed by an extension of the chamber wall.

Distribution: 43, 50, 56, 58-61, 66, 68.

92. *Lagena lonsdalensis* sp. nov.

Pl. 1, fig. 11

Test flask-shaped, circular in end view, contour bluntly angled at the broadest part of the test, slightly truncate at the base and ornamented by about 20 flat, slightly rounded costae

with narrow interspaces which continue up the neck to the simple aperture.

Holotype from 58-C7 (Lonsdale Bight), Reg. No. G2123. Length 0.60 mm, breadth 0.25 mm.

Common in Bass Strait shallow-water material, rare in the Lower Bay. This species is distinguished from other flask-shaped costate species by its angular outline and flattened, closely-spaced costae.

Distribution: 56, 58, 61, 68.

93. *Lagena portseaensis* sp. nov.

Pl. 1, fig. 13

Test with globular body smoothly merging into a short bluntly-rounded neck, ornamented by 12-16 narrow costae which are produced up the neck to form a pseudo-radiate aperture, neck solid, glassy and pierced by a narrow hole leading to the lumen. No entosolenian tube is present.

Holotype from 59-214, off Portsea, Reg. No. G2125. Length 0.31 mm, breadth 0.22 mm.

This is one of the species frequently lumped together as *L. acuticosta* Reuss, from which it differs in shape and in possessing a solid glassy neck. Fairly rare in Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58-61, 69.

Genus LENTICULINA Lamarck, 1804

94. *Lenticulina gibba* (d'Orbigny)

Cristellaria gibba d'Orbigny, 1839A, p. 62, pl. 7, figs. 20-21.

Common in Bass Strait shore sands and having a wide distribution in Port Phillip, though in small numbers. Specimens lack the characteristics which distinguish *L. subgibba* Parr (1950, p. 321, pl. xi, figs. 1-2a-b).

Distribution: 5-6, 9, 11, 13, 16-17, 19, 22, 26-28, 30, 32, 36, 50, 55-56, 58-62, 66-68.

95. *Lenticulina australis* Parr

Lenticulina (Robulus) australis Parr, 1950, p. 322, pl. xi, figs. 7-8.

Frequent in Bass Strait shore sands and occurring in small numbers in a few Lower Bay stations.

Distribution: 56, 58-59, 61, 68.

Genus PLANULARIA Defrance 1826

96. *Planularia patens* (Brady)

Vaginulina patens Brady, 1884, p. 533, pl. lxvii, figs. 15-16; Parr 1932, p. 221; 1950, p. 327.

Planularia patens (Brady). Parr 1939, p. 67, fig. 1.

Rare at Barwon Heads and in several stations in the Lower Bay.

Distribution: 56, 60-61, 68.

97. *Planularia australis* Chapman

Planularia australis Chapman, 1941, p. 158, pl. ix, fig. 1.

Specimens from Bass Strait beach sands (Areas 56, 58) are referable to this species, which was described from E. Bass Strait.

Genus SARACENARIA Defrance, 1824

98. *Saracenaria italica* Defrance

Saracenaria italica Defrance, 1820 etc. (1824). p. 176; Chapman 1941, p. 159; Parr 1950, p. 223.

Two specimens were found in Areas 60 and 68 in the Lower Bay.

99. *Saracenaria latifrons* (Brady)

Cristellaria latifrons Brady, 1884, p. 544, pl. lxviii, fig. 19, pl. cxiii, fig. 11.

Saracenaria latifrons (Brady). Parr, 1950, p. 324.

Two specimens were found in Areas 61 and 68 in the Lower Bay.

Genus VAGINULINA d'Orbigny, 1826

100. *Vaginulina vertebralis* Parr

Vaginulina vertebralis Parr, 1932, p. 221, pl. xxii, fig. 42; 1945, p. 200.

Common at Barwon Heads, occasional in the Lower Bay.

Distribution: 50, 56, 58, 61, 68.

Subfamily PLECTOFRONDICULARIINAE

Genus PLECTOFRONDICULARIA Liebus, 1902

101. *Plectofrondicularia* aff. *californica*
Cushman

aff. *Plectofrondicularia californica* Cushman, 1926B, p. 39, pl. 6, figs. 9-11.

Two specimens, both incomplete, one showing the aboral end with proloculus, two biserial and four equitant chambers, the other showing the oral end with three chambers were found in Areas 56 and 58. Specimens are elongate and slightly tapering, with concave faces, simple depressed sutures and strongly tricarinate edges. They are clearly different from the Victorian Miocene species *P. australis* (Heron-Allen and Earland). As no complete specimen was found, the form is recorded by open nomenclature.

Genus *BOLIVINELLA* Cushman, 1927

102. *Bolivinella folium* (Parker and Jones)

Textularia folium Parker and Jones, 1865, pp. 370, 420, pl. xviii, fig. 19.
Bolivinella folium (Parker and Jones). Cushman 1927A, p. 79; Parr 1932, p. 223, pl. xxi, fig. 23; 1945, p. 205.

Fairly common at Barwon Heads and penetrating the Lower Bay to a small extent. Plastogamic pairs are not unusual.

Distribution: 50, 56, 58-59, 66.

103. *Bolivinella pendens* sp. nov.

Pl. 1, figs. 14a-b

Test ovate to pyriform in outline, compressed, biserial throughout. Initial chamber broad and low, subsequent chambers narrow, strongly recurved and drooping toward the periphery. Sutures limbate, projecting, beaded only near centre-line, otherwise smooth. Periphery sharp-edged and bluntly spined at intervals by projecting chambers. Aperture obscure, terminal. Wall hyaline, radiate.

Holotype from 56-C8, Reg. No. G2126. Length 0.50 mm, breadth 0.33 mm, thickness 0.05 mm.

This species occurs together with *B. folium* at Barwon Heads but penetrates further into the Lower Bay. It differs consistently from *B. folium* in its elongate-ovate shape, rather than flabelliform, its strongly recurved and drooping chambers, and its smooth projecting sutures with beading restricted to near the centre-line. It also differs from the tropical *B. elegans* Cushman, which has projecting sutures but a

flabelliform outline. Plastogamic pairs have not been seen in this case.

Distribution: 50, 56, 58, 61, 68.

Family POLYMORPHINIDAE d'Orbigny
 Subfamily POLYMORPHININAE d'Orbigny
 Genus *GLOBULINA* d'Orbigny, 1839

104. *Globulina gibba globosa* (v. Munster)

Polymorphina globosa von Munster, 1838, p. 386, pl. iii, fig. 33.

Globulina gibba d'Orbigny var. *globosa* (v. Munster). Cushman and Ozawa 1930, p. 64, pl. 17, figs. 8-9; Parr and Collins 1937, p. 199, pl. xii, fig. 13; Parr 1945, p. 205; Albani 1968, p. 104.

Not uncommon in Bass Strait stations but not found within Port Phillip. Fistulose specimens occasionally occurred.

Distribution: 56, 58.

Genus *GUTTULINA* d'Orbigny, 1839

105. *Guttulina regina* (Brady, Parker and Jones)

Polymorphina regina Brady, Parker and Jones, 1870, p. 241, pl. xli, figs. 32a-b; Chapman 1909, p. 132, pl. x, fig. 4.

Guttulina regina (Brady, Parker and Jones). Cushman and Ozawa 1930, p. 34, pl. 6, figs. 1-2; Parr and Collins 1937, pl. xii, fig. 5, text-figs. 1-7; Parr 1945, p. 204; Albani 1968, p. 104, pl. 8, figs. 14-15.

This is one of the commonest polymorphinids in Port Phillip, being generally distributed except for the central basin and Corio Bay, and is also found in Bass Strait stations. Bay specimens are generally much larger than those from Bass Strait, tending to become considerably elongated. One specimen from Altona Bay (Area 5) measured 1.75 mm in length and 0.58 mm in breadth, compared with 0.62 mm and 0.35 mm for the largest specimen from Barwon Heads. This suggests that stillwater conditions are less than optimum for this species, causing delayed reproduction and consequent increased size.

Distribution: 5-7, 9-10, 13, 17-18, 22, 30-31, 36, 42-43, 50, 56, 58, 60-62, 66-69.

106. *Guttulina yabei attenuata* subsp. nov.

Polymorphina thouini d'Orbigny. Chapman 1909, p. 132, pl. 10, fig. 2.

Guttulina yabei Cushman and Ozawa. Parr and Collins 1937, p. 192 (pars), pl. xiii, figs. 4a-c (non pl. xii, figs. 3-4a-c).

Test elongate, 4-5 times as long as wide, chambers elongated, strongly overlapping and quinqueloculine in arrangement, sutures depressed. Wall thin, smooth and hyaline, aperture radiate.

Holotype: specimen illustrated by Parr and Collins 1937, pl. xiii, fig. 4a-c.

Parr and Collins recorded *G. yabei* from various localities and illustrated a specimen cited herein as subsp. *attenuata* from off Black Rock, Port Phillip (Area 13), which is referred to as 'particularly slender' with the suggestion that the discharge of fresh water from the Yarra River caused foraminifers in this area to be thin-shelled and otherwise atypical. The present material, however, has shown that this elongate form is well distributed in most parts of Port Phillip except the central basin and Corio Bay, including Lower Bay localities close to the Heads. It differs consistently from *G. yabei* s. str. in the proportions of the chambers and of the whole test, and appears to warrant at least subspecific status.

It does not occur in the present Bass Strait material and appears to be confined to Port Phillip, where it is as common as *G. regina* and has much the same distribution. Parr and Collins gave an incorrect plate reference for this form—'Plate XII' should read 'Plate XIII'. Distribution: 3, 5, 7, 9-10, 13, 17-18, 22, 30-31, 36, 39, 42-43, 48, 50, 60-63, 67-68.

107. *Guttulina silvestrii* Cushman and Ozawa

Guttulina (Sigmoidina) silvestrii Cushman and Ozawa, 1930, p. 51, pl. 37, figs. 6-7.

Guttulina silvestrii Cushman and Ozawa. Parr and Collins 1937, p. 197, pl. xii, fig. 11.

Described from the Victorian Miocene and recorded by the authors from the Holocene in S. Aust., this species was found at a number of locations in Port Phillip and also in Bass Strait stations. As noted by the authors it has some resemblance to a juvenile specimen of *Sigmoidella elegantissima* (P. and J.), a much larger species which was not found in the present collections.

Distribution: 5, 7, 11, 16, 18, 27, 30, 43, 50, 56, 58-62, 66, 68-69.

108. *Guttulina pacifica* Cushman and Ozawa

Guttulina (Sigmoidina) pacifica Cushman and Ozawa, 1930, p. 50, pl. 37, figs. 3, 5.

Guttulina pacifica Cushman and Ozawa. Albani 1968, p. 104, pl. 8, figs. 27-28.

A few specimens were found in dredged material from the W. and S. Areas of Port Phillip.

Distribution: 9, 17, 30, 43, 62, 68.

Genus SIGMOIDELLA Cushman and Ozawa, 1928

109. *Sigmoidella kagaensis* Cushman and Ozawa

Sigmoidella kagaensis Cushman and Ozawa, 1928, p. 19, pl. ii, fig. 14; Parr and Collins 1937, p. 207, pl. xiv, fig. 10.

Four specimens were found in three Areas 56, 58 and 68. All were small in comparison with Japanese specimens, and tended to be drop-shaped in outline rather than somewhat parallel-sided. The species has been recorded from Bass Strait, but the present record must be considered slightly doubtful.

Genus SIGMOMORPHINA Cushman and Ozawa, 1928

110. *Sigmomorphina undulosa* (Terquem)

Polymorphina undulosa Terquem, 1878, p. 41, pl. 3 (8), fig. 35a-b.

Sigmomorphina undulosa (Terquem). Cushman and Ozawa 1930, p. 131, pl. 34, figs. 4-5.

Specimens from Bass Strait and Lower Bay stations correspond with the description of this species, previous records of which have been from the Atlantic. As noted by Cushman and Ozawa, some specimens become fistulose in the later chambers.

Distribution: 56, 58, 60-61, 68.

Family GLANDULINIDAE Reuss
Subfamily GLANDULININAE Reuss
Genus GLANDULINA d'Orbigny 1839

111. *Glandulina* cf. *laevigata* d'Orbigny

cf. *Glandulina laevigata* d'Orbigny, 1826, p. 252, No. 1, pl. 10, figs. 1-3.

One specimen from Barwon Heads could be referred to this well-known species, or it could possibly be the microspheric form of *G. antarctica* Parr (1950, p. 334, pl. xii, figs. 8-9a-b), which is practically indistinguishable in the absence of the megalospheric form. It could also be a reworked fossil, as the species occurs in the Victorian Tertiary. Until more material is available, the question is left open.

Genus LARYNGOSIGMA Loeblich and Tappan, 1953

112. *Laryngosigma williamsoni* (Terquem)

Polymorphina williamsoni Terquem, 1878, p. 37.
Signumorphina williamsoni (Terquem). Cushman and Ozawa 1930, p. 138, pl. 38, figs. 3-4; Parr and Collins 1937, p. 205, pl. xv, fig. 5; Parr 1932, p. 12, pl. 1, fig. 20; 1945, p. 205.
Laryngosigma williamsoni (Terquem). Loeblich and Tappan 1953, p. 84, pl. 16, fig. 1.

Typical specimens were found at three stations, Areas 49, 56 and 68.

113. *Laryngosigma australiensis* sp. nov.

Pl. 1, figs. 15a-b

Test compressed with rounded periphery, outline varying from parallel-sided to sub-elliptical, chambers in sigmoid series, at first originating at the base, later successively removed and becoming practically uniserial in some specimens. Sutures slightly depressed and recurved, aperture fissurine with a very short entosolenian tube, wall hyaline.

Holotype from 56-C8, Reg. No. G2127. Length 0.44 mm, breadth 0.19 mm, thickness 0.09 mm.

This species is similar to *L. williamsoni* in its parallel-sided form, but differs in that later chambers are successively further removed from the base, in some specimens becoming practically uniserial. The aperture is fissurine rather than radiate as in *L. williamsoni*.

Six specimens were found at Barwon Heads (56) and one at Lonsdale Bight (58). Others have been found in the Lower Pleistocene (Werrikoo Member) of the Glenelg River, and in the Middle Miocene (Balcombian) beds underlying at the same location. The Barwon Heads specimens could have been derived from

nearby coastal or submarine Tertiary exposures, but the Lonsdale Bight specimen is from an area where considerable downthrow has occurred and admixture from Tertiary sources is accordingly unlikely. It is therefore concluded that the species has persisted like many others of the Nodosaridae from Tertiary times.

Subfamily OOLININAE

Genus OOLINA d'Orbigny, 1839

114. *Oolina caudigera* (Wiesner)

Lagena (*Entosolenia*) *caudigera* Wiesner, 1931, p. 119, pl. 18, fig. 214.
Oolina caudigera (Wiesner). Loeblich and Tappan 1953, pl. 13, figs. 1-3.

Smooth globose specimens with a long entosolenian tube and a basal spine are referred to this species. They are fairly common at Barwon Heads (56) and occur also just inside the Heads. Some have a roughened, semi-opaque surface.

Distribution: 50, 56, 58-59.

115. *Oolina borealis* Loeblich and Tappan

Entosolenia costata Williamson, 1858, p. 9, pl. 1, fig. 18 (non *Oolina costata* Egger, 1857).
Oolina costata (Williamson). Parr 1950, p. 303.
Oolina borealis Loeblich and Tappan, 1954, p. 384.

A few specimens were found at Barwon Heads (56-C8) but not elsewhere.

116. *Oolina hexagona* (Williamson)

Entosolenia squamosa (Montagu) var. *hexagona* Williamson, 1848, pl. ii, fig. 23; 1858, p. 13, pl. i, fig. 32.
Oolina hexagona (Williamson). Parr 1950, p. 304.

Specimens showing the typical hexagonal reticulation were found in Areas 50 and 68.

117. *Oolina melo* d'Orbigny

Oolina melo d'Orbigny, 1839C, p. 20, pl. v, fig. 9; Parr 1950, p. 303.

Specimens showing the characteristic rounded scale-like ornament arranged in vertical rows were found in Areas 56 and 68.

118. *Oolina pseudocatenulata* (Chapman and Parr)

Lagena pseudocatenulata Chapman and Parr, 1937, p. 65, pl. vii, fig. 7.

Oolina pseudocatenulata (Chapman and Parr). Parr 1950, p. 304, pl. viii, fig. 5.

Rare specimens referable to this species were found at several Bass Strait and Lower Bay stations.

Distribution: 56, 58, 60, 68.

119. *Oolina variata* (Brady)

Lagena variata Brady, 1884, p. 461, pl. lxi, fig. 1.
Oolina variata (Brady). Parr 1950, p. 303.

Specimens were not uncommon at three Bass Strait and Lower Bay stations. Most were finely though irregularly costate rather than wrinkled as in Brady's figure, but as noted by Parr the species is variable in this respect.

Distribution: 56, 58, 68.

120. *Oolina guttaformis* sp. nov.

Pl. 1, figs. 16a-b

Test elongate-oval to pyriform, circular to somewhat compressed in end view, polished and finely perforate except at the apertural end and base which are clear, aperture radiate, leading to the base of the solid neck, no entosolenian tube.

Holotype from 56-C8, Reg. No. G2128. Length 0.40 mm, breadth 0.22 mm thickness 0.19 mm.

This species presents some anomalies. The compression of most specimens suggests *Fissurina*, but the aperture is radiate, not fissurine, and there is no entosolenian tube. Consideration has been given to the possibility of it being the initial chamber of a polymorphinid, but this is discounted by its size, frequency of occurrence and the absence of any adult polymorphinid with which it could be associated in the stations in which it occurs. It is concluded that it is best recorded as *Oolina*.

Distribution: 56, 58-59. Fairly common at Barwon Heads (56).

Genus *FISSURINA* Reuss, 1850

121. *Fissurina lacunata* (Burrows and Holland)

Lagena lacunata Burrows and Holland, 1895, p. 205, pl. i, figs. 12a-b.

Fissurina lacunata (Burrows and Holland). Parr 1945, p. 60; 1950, p. 310; Albani 1968, p. 105, pl. 8, fig. 16.

A common species in Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58-61, 67-68.

122. *Fissurina contusa* Parr

Fissurina contusa Parr, 1945, p. 203, pl. ix, fig. 6; Collins, 1958, p. 380.

This species has much the same distribution as *F. lacunata* but is generally less frequent.

Distribution: 50, 56, 58-61, 68.

123. *Fissurina lucida* (Williamson)

Entosolenia marginata var. *lucida* Williamson, 1858, p. 10, pl. i, figs. 22-23.

Lagena lucida (Williamson). Sidebottom 1904 (1906), p. i, pl. i, figs. 9-12.

Fissurina lucida (Williamson). Parr 1945, p. 203.

This species is common in Bass Strait and Lower Bay stations, and is the only fissurinid to be well represented N. of these Areas, being moderately common in littoral and near-shore stations in the W. Bay from Altona to Avalon Beach, Corio Bay. Specimens are consistent in form but variable in the width of the opaque peripheral bands.

Distribution: 5, 13, 16-17, 26-27, 42, 49-50, 56, 58-62, 67-68.

124. *Fissurina pacifica* Parr

Fissurina pacifica Parr, 1950, p. 314, pl. ix, figs. 10a-b.

Typical specimens are not uncommon at Barwon Heads (56) and occur in a few other Bass Strait and Lower Bay stations.

Distribution: 50, 56, 61, 68.

125. *Fissurina orbignyana* Seguenza

Fissurina orbignyana Seguenza, 1862, p. 66, pl. ii, figs. 25-26; Collins 1958, p. 331.

Large and robust specimens referable to this cosmopolitan species were found in beach material from Areas 56 and 58, but not elsewhere.

126. *Fissurina quinqueannulata* Parr

Fissurina quinqueannulata Parr, 1950, p. 310, pl. viii, figs. 13a-b.

Common in Bass Strait stations and extending well into the Lower Bay. It may be noted that the form described and figured by Parr (1945) as '*F. orbignyana* Seguenza var.' from Barwon Heads is apparently identical with this species, though Parr did not note this in his later work.

Distribution: 43, 50, 56, 58-59, 61, 68.

127. *Fissurina marginata* (Walker and Boys)

Serpula (Lagena) marginata Walker and Boys, 1784, p. 2, pl. 1, fig. 7.

Fissurina marginata (Walker and Boys), Parr 1950, p. 305.

Common in two Bass Strait beach stations (56, 58) and found also at one station in the Lower Bay (61). Parr's record was from off Tasmania.

128. *Fissurina pseudoformosa* sp. nov.

Pl. 2, figs. 20a-b

Test elongate-pyriform in outline with produced phialine neck, compressed, with a narrow, thick, tubulated keel of even width surrounding the body of the test and slightly notched at the base. A double row of radial tubules penetrate the keel itself, flanked by a single row of pores on each side which penetrate the test wall. The lower part of the neck and the base are ornamented by raised reticulate patches formed by elongated pits with intervening ridges. Aperture is terminal and circular, opening into a centrally-placed entosolenian tube extending about half-way down the body of the test.

Holotype from 56-C8, Reg. No. G2132. Length 0.40 mm, breadth 0.20 mm, thickness 0.13 mm.

This species differs from both *F. formosa* (Schwager) and Parr's variety *angusticarinata* (1950, p. 313, pl. ix, fig. 8) in its much narrower keel and in the presence of reticulate ornament at the base and neck. In this latter respect it is similar to one of the forms figured by Brady (1884, pl. lx, figs. 18-19) as *F. formosa*, but again differs in the narrow even keel. Thirteen specimens were found at Barwon Heads (56) and others in Areas 50, 58 and 68.

129. *Fissurina crassiannulata* sp. nov.

Pl. 2, figs. 17a-b

Test sub-ovate in outline, compressed, central area very slightly inflated and surrounded by a solid, rounded keel which is somewhat thicker than the central part, finely tubulate on the outer edges and with a clear, non-tubulate central band. Wall hyaline, clear and polished. Aperture slit-like, opening directly into the lumen without an entosolenian tube.

Holotype from 58-C7, Reg. No. G2129. Length 0.33 mm, breadth 0.27 mm, thickness 0.10 mm.

The distinctive feature of this species is the thick, rounded glassy keel which surrounds the comparatively depressed body of the test. The absence of an entosolenian tube is an anomalous feature of this species.

Distribution: 50, 56, 58-59, 61, 66, 68.

130. *Fissurina furcata* sp. nov.

Pl. 2, figs. 18a-b

Test pyriform in outline, compressed, periphery bluntly keeled. Short costae originate on the neck and branch downward to form two low inner keels which surround the body of the test. Aperture fissurine with an entosolenian tube extending about halfway to the base. Central area clear and very finely perforate.

Holotype from 56-C8, Reg. No. G2130. Dimensions: length 0.28 mm, breadth 0.16 mm, thickness 0.09 mm.

This species is characterized by the complex of costae originating on the neck and forming a five-keeled periphery. It occurs at Barwon Heads and in six stations in the Lower Bay. Distribution: 43, 50, 56, 61, 68.

131. *Fissurina multipunctata* sp. nov.

Pl. 2, figs. 19a-b

Test oval, compressed, with a bluntly-rounded non-perforate keel, wall conspicuously punctate, aperture fissurine with an entosolenian tube extending for about 0.3 of the length of the test.

Holotype from 66-292, Reg. No. G2131. Length 0.24 mm, breadth 0.19 mm, thickness 0.12 mm.

This small species resembles *F. plana* (Matthes) in shape and in the possession of a blunt keel, but differs in the punctate character of the wall which resembles morocco leather in surface texture.

Distribution: 56, 58, 66, 68.

132. *Fissurina semimarginata* (Reuss)

Lagena marginata Williamson var. *semimarginata* Reuss, 1870, p. 468; Brady 1884, p. 446, pl. cix, fig. 17.

Fissurina semimarginata (Reuss). Loeblich and Tappan 1953, p. 78, pl. 14, fig. 3.

Single specimens were found at Barwon Heads (56-C8) and at Lonsdale Bight (58-C7) which correspond exactly to Loeblich and Tappan's fig. 3 and with Brady's fig. 17 (not 18-19 which do not appear to be conspecific).

133. *Fissurina foraminata* (Matthes)

Lagena foraminata Matthes, 1939, p. 81, pl. 6, fig. 110.

Single specimens from Barwon Heads and from Lonsdale Bight show the narrow keel and conspicuously perforate body of this species, described from the Tertiary of Germany.

134. *Fissurina fasciata* (Egger)

Oolina fasciata Egger, 1857, p. 270, pl. 17, fig. 15.
Lagena fasciata (Egger). Sidebottom 1904 etc. (1906), p. 6, pl. 1, figs. 13-16.

Specimens are sub-circular and somewhat compressed, with rounded periphery and a broad fissurine aperture. White opaque peripheral bands on each side meet at the base in some specimens and are separated in others. Rare at Lonsdale Bight (58) and in Areas 61 and 68.

Superfamily BULIMINACEA

Family BULIMINOIDIDAE

Genus BULIMINOIDES Cushman *emend.*
Sieglic, 1970

135. *Buliminoides gracilis* (Collins)

Buliminella gracilis Collins, 1953, p. 102, pl. 1, figs. 8a-b; Albani 1968, p. 106, pl. 8, fig. 9.

Buliminoides gracilis (Collins). Sieglic 1970, p. 112 (in text).

Described originally from the Pleistocene of Port Fairy, W. Victoria, this species has been

found to be fairly common in Holocene Victorian shallow-water deposits, and as far N. as Port Hacking, N.S.W. (Albani 1968). Following the re-definition of *Buliminoides* by Sieglic (1970) it is transferred to that genus. It is frequent in Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58, 61, 66, 68.

136. *Buliminoides madagascariensis* (d'Orbigny)

Bulimina madagascariensis d'Orbigny, 1826, p. 270, No. 17.

Buliminella madagascariensis (d'Orbigny). Cushman and Parker 1947, p. 68, pl. 17, figs. 15-17.

Buliminoides madagascariensis (d'Orbigny). Sieglic 1970, p. 112 (in text).

Large and well-developed specimens of both the megalospheric and microspheric forms were common at Barwon Heads (56) and occurred in smaller numbers at other Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58, 60, 66, 68.

Family SPHAERODINIDAE

Genus SPHAERODINA d'Orbigny, 1826

137. *Sphaeroidina bulloides* d'Orbigny

Sphaeroidina bulloides d'Orbigny, 1826, p. 267, No. 1, Modèles No. 65; Parr 1945, p. 214; 1950, p. 347.

Common at Barwon Heads, occasional in other Bass Strait stations and rare in the Lower Bay.

Distribution: 50, 56, 58, 61, 66.

Family BOLIVINITIDAE

Genus BOLIVINA d'Orbigny, 1839

138. *Bolivina subreticulata* Parr

Bolivina subreticulata Parr, 1932, p. 12, pl. i, figs. 21a-b; 1950, p. 339.

Four specimens from Barwon Heads and isolated single specimens from the Lower Bay and Geelong Outer Harbour. This species appears to be rare in southern waters. Parr described it from Raine Is. and recorded it from Point Lonsdale only, later recording a single specimen from off Tasmania.

Distribution: 38, 50, 56, 66, 68.

139. ***Bolivina pseudoplicata*** Heron-Allen
and Earland

Bolivina pseudoplicata Heron-Allen and Earland, 1929 etc. (1930), p. 81, pl. 3, figs. 36-40; Cushman 1937A, p. 166, pl. 19, figs. 12-20; Parr 1945, p. 206.

This species is common and widely distributed in all parts of Port Phillip except the central basin, and also common in Bass Strait stations. Distribution: 5-6, 10-11, 13, 16-18, 22, 26-28, 30-31, 36, 38, 40, 42, 48-50, 56, 58-63, 66-69.

140. '***Bolivina***' ***subtenuis*** Cushman

Bolivina subtenuis Cushman, 1936, p. 57, pl. 8, fig. 10; 1937A, p. 148, pl. 19, figs. 33-34; Collins 1953, p. 101, pl. i, fig. 7.

The characteristics of this species, including the irregular arrangement of apparent chamberlets and in particular the assymmetrically-placed aperture with radial grooves separate it from *Bolivina* s. str. The latter characteristic suggests a relationship with *Buliminoides*, which is reinforced by the occasional example with resorbed and open apertural area, similar to post-plastogamic tests of *Buliminoides* illustrated by Sieglie (1970). Insufficient material is as yet available to pursue this question further.

Distribution: 50, 56, 58, 68, single specimens only.

141. ***Bolivina robusta*** Brady

Bolivina robusta Brady, 1881, p. 27; 1884, p. 421, pl. liii, figs. 7-9; Parr 1950, p. 340; Collins 1953, p. 96; Albani 1968, p. 106.

Common in Bass Strait stations and in the Lower Bay, and at scattered locations within Port Phillip.

Distribution: 7, 11, 19, 29-30, 32-33, 35-36, 49-50, 54, 56, 59-61, 66-68.

142. ***Bolivina compacta*** Sidebottom

Bolivina robusta Brady var. *compacta* Sidebottom, 1904 etc. (1905), p. 15, pl. 3, fig. 73.

Bolivina compacta Sidebottom, Cushman 1910 etc. (1911), p. 36, pl. 3, fig. 73, text-fig. 58; Parr 1945, p. 206, pl. ix, fig. 8; 1950, p. 338.

Fairly common in Bass Strait and Lower Bay stations, also found in the W. Bay between Altona and Avalon.

Distribution: 5, 13, 16-18, 26, 28, 30, 42, 49-50, 56, 58-61, 66, 68.

143. ***Bolivina decussata*** Brady

Bolivina decussata Brady, 1881, p. 28; 1884, p. 423, pl. liv, figs. 12-13; Sidebottom 1918, p. 128; Parr 1950, p. 338.

Rare specimens were found in Areas 58, 61 and 68.

144. ***Bolivina lobata*** Brady

Bolivina lobata Brady, 1881, p. 28; 1884, p. 425, pl. liii, figs. 22-23.

Five specimens from Barwon Heads and one each from Areas 50 and 68. Tests are biserial throughout, and the ornament on the angular shoulders of the later chambers tends to be raised-reticulate as suggested by Brady's figures, though his description reads 'more or less granulate'.

Genus BRIZALINA Costa, 1856

145. ***Brizalina striatula*** (Cushman)

Bo'ivina striatula Cushman, 1918 etc. (1922), p. 27, pl. 3, fig. 10; Parr 1950, p. 239.

An elongate bolivine with rounded periphery, having the lower half of the test finely striate is referred to this species, which was recorded by Parr from the Antarctic. The degree of striation varies a good deal, from fairly coarse to almost indistinguishable, in specimens which in all other respects appear to be conspecific. No retral processes or basal lobes appear on the chambers, and accordingly the species should be transferred to *Brizalina*.

Common in most parts of Port Phillip, the exception being the central basin where only one specimen was found. Also occurs at Barwon Heads.

Distribution: 3, 5-7, 10-11, 13, 16-19, 22-23, 25-30, 33, 35-36, 38-40, 42, 49-50, 54-56, 59, 61-62, 67-68.

Genus RECTOBOLIVINA Cushman, 1927

146. ***Rectobolivina digitata*** Parr

Rectobolivina digitata Parr, 1945, p. 206, pl. ix, fig. 10.

Common in Bass Strait and Lower Bay stations, and rare in a few isolated stations in the E. and W. parts of Port Phillip.

Distribution: 16, 26, 30, 48, 50, 56, 58-61, 66, 68.

147. *Rectobolivina dimorpha pacifica*
Cushman

Siphogenerina dimorpha (Parker and Jones) var. *pacifica* Cushman, 1926, p. 13, pl. 2, fig. 9, pl. 3, figs. 6a-b; 1932 etc. (1942), p. 53, pl. 15, fig. 4.

Four specimens were found at three stations in the Lower Bay and Bass Strait (Areas 61, 66 and 68). The early chambers were biserial, placing it in *Rectobolivina*.

148. *Rectobolivina raphanus* (Parker and Jones)

Uvigerina (*Sagrina*) *raphanus* Parker and Jones, 1865, p. 364, pl. xviii, figs. 16-17.
Siphogenerina raphanus (Parker and Jones). Parr 1932, pl. xxi, fig. 24; 1945, p. 207.

Fairly common in Bass Strait and Lower Bay stations, with an isolated group of occurrences in the N. Bay. There is considerable variation between Bass Strait and N. Bay examples. Those from Barwon Heads show a smooth rounded initial chamber with closely-spaced costae starting in the early biserial portion, and an aperture with projecting phialine neck. Those from the N. Bay have fewer and stronger costae which curve around the initial chamber to form strong projecting flanges, and the aperture has only a slight lip.

These extreme forms are sufficiently differentiated to warrant specific separation, but in the Lower Bay both forms are found, with many specimens showing intermediate characteristics. It is concluded that a cline exists between the open-coast form and the stillwater modification of the N. Bay. Unlike the case of *Quinqueloculina poeyana victoriensis* there is so far no evidence of long-standing differentiation, and accordingly the variations are noted for the record without nomenclatorial distinction.

Distribution: 6-7, 11, 43, 50, 56, 58, 60-62, 68.

Family ISLANDIELLIDAE

Genus CASSIDULINOIDES Cushman, 1927

149. *Cassidulinoides chapmani* Parr

Cassidulinoides chapmani Parr, 1931, p. 99, text-figs. a-c; Parr 1932, p. 231, pl. xxii, figs. 36a-c, 37; Chapman and Parr 1937, p. 83.

Common at Barwon Heads (56) and present in smaller numbers in a few Bass Strait and Lower Bay stations, rare in the W. Bay. A specimen from Parr's original Miocene material was sectioned and found to be radially built, confirming Parr's placing of the species in *Cassidulinoides*. The aperture is loop-shaped, rising from the junction with the previous chamber in a semi-circular depression in the apertural face, and has an internal tooth-plate attached to one side of the aperture and curving back to the other side of the septal foramen. Parr's text-figures over-emphasize the sutures, which are flush or only slightly depressed, and visible mainly as a change in the translucency of the wall.

Distribution: 19, 43, 50, 56, 58, 60, 62, 66, 68.

Family BULIMINIDAE

Subfamily BULIMININAE

Genus BULIMINA d'Orbigny, 1826

150. *Bulimina marginata* d'Orbigny

Bulimina marginata d'Orbigny, 1826, p. 269, No. 4, pl. xii, figs. 10-12; Cushman and Parker 1947, p. 119, pl. 28, figs. 5-6; Parr 1945, p. 205.

Specimens referable to this cosmopolitan species were found throughout Port Phillip and also in Bass Strait stations. It is one of the few species found commonly in the sparse assemblages of the central basin. The characteristic of undercut and denticulate or spinous chamber margin is common, but proportions vary widely. For this reason, reference has not been made to *B. submarginata* Parr (1950), as the differences in proportion noted for that species appear to fall within the limits of variability of the present population, together with *B. marginata* s. str. A further variation noted is the loss of denticulation in the later chamber margins, some specimens in this regard approach *B. denudata* Cushman and Parker.

Distribution: 3, 5-7, 11-13, 16-20, 22, 26-30, 32-33, 35, 36-39, 46-47, 50, 53-56, 58-59, 61-62, 66-68.

151. *Bulimina elongata* d'Orbigny

Bulimina elongata d'Orbigny, 1826, p. 279, No. 9;
Cushman and Parker 1947, p. 108, pl. 25, figs.
14-17.

A slender elongate bulimine with inflated but not undercut chambers is referred to this species, described from the Miocene of Austria, and recorded from the Holocene in the Indo-Pacific. It is a common species in Port Phillip, but is absent from Bass Strait stations and from Areas immediately inside the Heads. Like *B. marginata*, it occurs in many of the sparse assemblages of the central basin.

Distribution: 2-3, 5-7, 9-13, 17-20, 22-23, 27-28, 30-33, 35-37, 42, 47, 53-55, 61-63, 67-68.

152. *Bulimina echinata* d'Orbigny

Bulimina echinata d'Orbigny, 1826, p. 279, No. 9;
Cushman and Parker 1947, p. 108, pl. 25, figs.
14-17; Parr 1939, p. 67, pl. (unnumbered), fig. 7.

A comparatively rare species mostly confined to the Lower Bay off Rye, with occasional specimens occurring further N. Most specimens are fairly typical, but some elongate forms are only differentiated from *B. elongata* by the spinous growth on the lower half of the test. The species was recorded by Parr from the Pliocene of Jemmy's Point, E. Gippsland, Vict., and present specimens agree well with specimens from that locality.

Distribution: 32, 55, 61, 68.

Subfamily PAVONININAE

Genus PAVONINA d'Orbigny, 1826

153. *Pavonina triformis* Parr

Pl. 2, fig. 21

Pavonina triformis Parr, 1933, p. 29, pl. vii, figs. 1,
2a-c, 3a-b.

This species was described from the lower clay beds of Yellow Bluff, Torquay, Vict., regarded by Carter (1958) as being of Longfordian (Lower Miocene) age. It is distinguished from the well-known Indo-Pacific genotype *P. flabelliformis* by its extended and

sharply trihedral early triserial stage and its reduced biserial to uniserial stage, which never reaches the degree of envelopment of the initial portion shown by mature specimens of the latter species.

Specimens referable to this species were found in Areas 50, 56, 58, 61 and 68. While the occurrence at Barwon Heads (56) might be suspect as possibly remanié, no evidence of such admixture has been found in the Lower Bay (50, 61, 68), and it is therefore concluded that all specimens are Holocene. The nine specimens found are all small, roughly triangular in shape and show at the most one uniserial chamber. Most have a bluntly angular trihedral portion; the figured specimen from 50-233 (Reg. No. G2133) is however sharply keeled, similar to Parr's fig. 2.

Parr reported his species from localities giving a time range of Longfordian to Batesfordian in Victoria. A slide from his collection contains a specimen labelled 'Lower Miocene (F3) Hilly country W. of Semarang, Java', suggesting a wide range during the Tertiary. The writer has found specimens in material from a Mines Department bore at Hamilton, Vict., together with *Orbulina universa* d'Orb. and *Biorbulina bilobata* (d'Orb), suggesting Bairnsdalian (Upper Mid. Miocene) age. A single specimen was also found in the Cheltenhamian (Upper Miocene) of Beaumaris, Vict.

Parr considered that post-Lower Miocene specimens were referable to *P. flabelliformis*, having evolved from *P. triformis* by Pliocene time, and illustrated his argument by fig. 5, which undoubtedly represents the former species from the Lower Pliocene of Forsyth's, Grange Burn, Hamilton. However, the present evidence suggests that the presumed ancestral form persisted to the Holocene in the cooling waters of S. Vict., while the full development of *P. flabelliformis* took place in the warmer waters of the Indo-Pacific. In this regard, Parr's record (1933, p. 29) of a 'small, imperfect' specimen of *P. flabelliformis* from the Post-Tertiary of the Boneo bore, near Sorrento, strongly suggests that the present species was involved.

Genus CHRYSALIDINELLA Schubert, 1908

154. *Chrysalidinella dimorpha* (Brady)

Chrysalidina dimorpha Brady, 1881, p. 24; 1884, p. 338, pl. xlv, figs. 20-21.

Chrysalidinella dimorpha (Brady). Schubert 1908, p. 243; Parr 1945, p. 260; Albani 1968, p. 107.

One specimen only, from Area 62. Parr reported it from Barwon Heads and Albani from Port Hacking, N.S.W. It is a rare species S. of the tropics.

Genus FIJIELLA Loeblich and Tappan, 1962

155. *Fijiella simplex* (Cushman)

Trimosina simplex Cushman, 1929, p. 158, fig. 2a-b.

Fijiella simplex (Cushman). Loeblich and Tappan 1962, p. 109.

This species is not uncommon in Bass Strait shore sands and its range extends into the Lower Bay. The supplementary cribrate apertures on the oral face are quite obvious and distinguish it from *Reussella*.

Distribution: 43, 50, 56, 58-62, 69.

Genus REUSSELLA Galloway, 1933

156. *Reussella armata* (Parr)

Reussia armata Parr, 1932, p. 224, pl. xxii, figs. 49-50a-b (non *Reussia* McCoy 1854).

Reussella armata (Parr). Parr 1945, p. 206.

Rare specimens were found in Area 51 (Lower Bay) and 58, 66 (Bass Strait). This species is fairly common in S. Aust. but distinctly rare in Victorian waters. Parr recorded it from Barwon Heads.

Family UVIGERINIDAE

Genus EUUVIGERINA Thalmann, 1952

157. *Euuvigerina bassensis* (Parr)

Uvigerina bassensis Parr, 1950, p. 340, pl. xii, figs. 19-20; Collins 1953, p. 96; Albani 1968, p. 107, pl. 8, fig. 10.

Common in Bass Strait stations and extending into the Lower Bay, but not ranging further into Port Phillip. Both the stout and slender forms figured by Parr occurred. The narrow simple toothplate of this species places it in *Euuvigerina*.

Distribution: 43, 50, 56, 58-63, 66-67, 69.

158. *Euuvigerina compacta* sp. nov.

Pl. 2, figs. 22a-b

Test sub-cylindrical, about 2.5 times as long as broad, both ends broadly rounded, chambers closely appressed and tending to recurve toward the base, sutures depressed, surface finely costate with costae partly continuous over chambers, aperture rounded, terminal with a short neck, toothplate narrow, attached to foramen of previous chamber.

Holotype from 56-C8, Reg. No. G2134. Length 0.50 mm, breadth 0.21 mm.

The distinctive features of this species are the more or less parallel-sided form with broadly rounded base and the closely appressed and recurved chamber shape. Specimens were found at five Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58, 68.

Genus SIPHOVIGERINA Parr, 1950

159. *Siphouvigerina canariensis* (d'Orbigny)

Uvigerina canariensis d'Orbigny, 1839B, p. 138, pl. i, figs. 25-27; Brady 1884, p. 573, pl. lxxiv, figs. 18-19.

Present in Bass Strait stations and having a somewhat unusual distribution in Port Phillip, ranging up the E. coast from the Lower Bay to the head of the Bay at Altona, and occurring at two stations in Geelong Outer Harbour.

Distribution: 5-6, 13, 16, 28, 36, 48, 50, 58, 61, 63, 66, 68.

Genus TRIFARINA Cushman, 1923

160. *Trifarina angulosa* (Williamson)

Uvigerina angulosa Williamson, 1858, p. 67, pl. v, fig. 140.

Angulogerina angulosa (Williamson). Parr 1945, p. 207; 1950, p. 341.

Trifarina angulosa (Williamson). Loeblich and Tappan 1964, p. C571, fig. 450, 1-3.

Common at most Bass Strait and Lower Bay stations.

Distribution: 43, 49-50, 56, 58-62, 66-69.

161. *Trifarina bradyi* Cushman

Trifarina bradyi Cushman, 1918 etc. (1923), p. 99, pl. 22, figs. 3-9; Chapman and Parr 1937, p. 98.

Occurs in eight Bass Strait and Lower Bay stations. Chapman and Parr recorded it from off Tasmania.

Distribution: 50, 56, 58, 61-62, 68.

162. *Trifarina elliptica* (Dorreen)

Angulogerina elliptica Dorreen, 1948, p. 293, pl. 38, fig. 9.

Specimens corresponding with the figure and description of this species, described from the Upper Eocene of New Zealand, are fairly common in the Lower Bay and Bass Strait. Specific characteristics include the lack of surface ornament, the rounded axial ridges formed by backward-extending lobes of successive chambers and the kidney-shaped terminal aperture with a slight lip.

Distribution: 43, 49-50, 56, 59-62, 67-68.

Genus HOPKINSINA Howe and Wallace, 1932

163. *Hopkinsina pacifica* Cushman

Hopkinsina pacifica Cushman, 1933, p. 86, pl. 8, figs. 16a-b.

Eleven specimens referable to this species were found in material from Geelong Outer Harbour (28, 30). It was described from Tonga in the tropical Pacific.

164. *Hopkinsina victoriensis* sp. nov.
Pl. 2, figs. 23a-b

Test slightly compressed, tapering from initial end to greatest width in the final chamber, triserial in early stage, becoming biserial in later chambers, wall ornamented by strong longitudinal costae which tend to become obsolete on the final chamber, sutures depressed, aperture irregularly rounded with everted lip. *Holotype* from 16-282, Reg. No. G2135. Length 0.39 mm, breadth 0.14 mm, thickness 0.10 mm.

Other specimens were found in the N. Bay and in the Lower Bay. It does not appear to be referable to any described species, the nearest being *H. hancocki* Todd, which differs in having high, sharp and serrated costae and a long apertural neck.

Distribution: 6, 16, 61, 68 (six stations).

Superfamily DISCORBACEA

Family DISCORBIDAE

Subfamily DISCORBINAE

Genus DISCORBIS Lamarek, 1804

165. *Discorbis dimidiatus* (Parker and Jones)

Discorbina dimidiata Parker and Jones, 1862, p. 201, text-fig. 32b.

Discorbis vesicularis (Lamarek) var. *dimidiata* (Parker and Jones). Parr 1932, p. 227, pl. xxi, figs. 27a-c, 29a-c.

Discorbis dimidiatus (Parker and Jones). Parr 1945, p. 208; Hedley, Hurdle and Burnett 1967, p. 33, pl. 1, fig. 4, pl. 10, figs. 1-3, text-figs. 28-43; Albani 1968, p. 108, pl. 8, figs. 18, 24.

This well-known species is very common in Bass Strait and Lower Bay stations. Elsewhere in Port Phillip it is represented only by odd specimens, usually small and somewhat broken and eroded, except for the beach stations C1 (Altona) and C2 (Kirk Point) where it is present in numbers and well developed. It is probably more widely distributed in the sublittoral waters of Port Phillip than the present collections indicate.

Amongst the material studied were some strongly biconvex specimens with an excess of secondary thickening on both faces, which in the extreme case fills the umbilical area with a clear projecting boss from which radial thickenings curve outward along the sutures. In such specimens the spiral side is dome-like and polished, the early chambers being clearly visible through the secondary thickening. These appear to be linked with typical *D. dimidiatus* by equally biconvex specimens in which the umbilical flaps are heaped up and welded together in an irregular mass.

In view of the considerable variability of this species (Hedley et al. 1967) it is considered that such specimens are individual variations caused by the secretion of an excess of secondary calcite.

Distribution: 5-6, 10, 16-17, 22, 26-27, 31, 39, 42-43, 49-51, 56, 58-62, 66-69.

Genus BRONNIMANNIA Bermudez, 1952.

166. *Bronnimannia haliotis* (Heron-Allen and Earland)

Discorbina haliotis Heron-Allen and Earland, 1924, p. 173, pl. viii, figs. 99-101.

- Discorbis haliotis* (H.-A. and E.). Parr 1939, p. 68; Collins 1953, p. 96.
Planulina haliotis (H.-A. and E.). Chapman 1941, p. 176.
Bronnimannia haliotis (H.-A. and E.). Collins 1958, p. 406; Todd, 1965, p. 27, pl. 5, fig. 2.

Three specimens were found at Barwon Heads (56) and two in Area 68. The species was described from the Middle Miocene of Victoria and has since been recorded from the Holocene of W. Aust., Bass Strait and the Great Barrier Reef.

Genus DISCORBINELLA Cushman and Martin, 1935

167. **Discorbinella infrapapillata** sp. nov.
 Pl. 2, figs. 24a-c

Test trochospiral, sub-circular, concavo-convex with sharply keeled and lobulate periphery. Dorsal side convex, partly evolute, with sigmoid-radial flush sutures, surface polished and finely perforate, with pores concentrated toward edges of chamber wall, the central part being only lightly pored. Ventral side concave with shallow umbilicus, surface papillate, sutures sinuous and slightly depressed, with a re-entrant sinus forming an apertural flap. Peripheral aperture oval with slightly raised lip, at junction of last chamber and previous whorl, umbilical aperture a low arch below flap, obscure and usually visible on the last chamber only. Wall structure radial and hyaline.

Holotype from 56-C8, Reg. No. G2136. Diameter 0.33 mm, thickness 0.15 mm.

This small species is not typical of *Discorbinella*, as the dorsal (spiral) side is not completely evolute, showing only the initial chamber and the inner edges of a few chambers in the first whorl. This is a matter of degree, and the apertural characteristics clearly place it in this genus. It may be noted that the papillae are randomly distributed, not in radial lines as in some species of the Glabratellidae.

Distribution: 50, 56, 58, 66-68.

Genus EPISTOMINELLA Haseawa and Maruhasi, 1944

168. **Epistominella exigua** (Brady)

- Pulvinulina exigua* Brady, 1884, p. 696, pl. ciii, figs. 13-14.
Pulvinulinella exigua (Brady). Parr 1950, p. 351.
Epistominella exigua (Brady). Parker, Phleger and Peirson 1953, p. 43, pl. 9, figs. 35-36; Todd 1965, p. 30, pl. 10, fig. 1.

One specimen of this deep-water species was found at Barwon Heads (56), in a mixed assemblage of shallow-water and off-shore species.

Genus NEOCONORBINA Hofker, 1951

169. **Neoconorbina frustata** (Cushman)

- Discorbis frustata* Cushman, 1933, p. 88, pl. 9, fig. 2.
Rosalina frustata (Cushman). Collins 1958, p. 404.
Neoconorbina frustata (Cushman). Todd 1965, p. 18, pl. 1, fig. 7.

Three specimens of this rare species were found at Barwon Heads (56) and two more in Area 68. It has hitherto been regarded as being of tropical distribution.

170. **Neoconorbina tuberocapitata** (Chapman)

- Discorbina tuberocapitata* Chapman, 1900, p. 11, pl. i, fig. 9.
Neoconorbina tuberocapitata (Chapman). Todd 1965, p. 17, pl. 1, figs. 8-9.

One specimen from 50-233 shows the long arcuate chambers, thin flanged base and columnar form of the early part of the test which characterize this species. It differs in that the apex is slightly excavated rather than rounded, but is considered to be referable to Chapman's species, which was described from Funafuti and recorded by Todd from Fiji.

171. **Neoconorbina terquemi** (Rzehak)

Pl. 2, figs. 25a-c

- Discorbina terquemi* Rzehak, 1888, p. 228.
Neoconorbina terquemi (Rzehak). Todd 1958, p. 96; 1965, p. 16, pl. 5, fig. 6; Loeblich and Tappan 1964, p. C582, fig. 457, 5a-c.

This small species is referred with some reservations. It has the long arcuate overlapping chambers and the distinct apertural flap of *N.*

terquemi, but may have as many as five chambers in the last whorl, though most specimens have three. It is more compressed than the specimen figured by Todd, being closer to that figured by Loeblich and Tappan in this respect. *Figured specimen* from 10-15, Reg. No. G2137. Major diameter 0.26 mm, thickness 0.10 mm.

It is confined to Port Phillip in the present material, being best represented in the W. Bay where it is fairly common. This is another cause for doubt, as *N. terquemi*, from the records, has a wide oceanic range. It may represent a remanent population which is differentiating under stillwater conditions, but the differences observed do not appear to warrant separation.

Distribution: 5-7, 9-10, 13, 16-17, 19, 25-28, 30-31, 36, 40, 42, 47, 49-50, 60-63, 67-68.

Genus *PATELLINELLA* Cushman, 1928

172. *Patellinella inconspicua* (Brady)

Textularia inconspicua Brady, 1884, p. 357, pl. xlii, figs. 6a-c.

Patellinella inconspicua (Brady). Cushman 1928, p. 5, pl. 1, figs. 8a-c; Parr and Collins 1930, p. 92, pl. 4, fig. 7; Parr 1945, p. 208; Albani 1968, p. 108, pl. 8, figs. 22-23.

A common species in Bass Strait and the Lower Bay. The writer has earlier (1958, p. 407) expressed the opinion that the many tropical records of this species are erroneous, though it undoubtedly extends as far N. as Sydney (Albani 1968).

Todd (1965, p. 9, pl. 1, fig. 3) has figured a specimen referred to this species which is closer to the Bass Strait form than most tropical records. However, it differs in having lower and broader chambers which do not interdigitate at the junction, and lacks the conspicuous pores and the discorbine early chambers which characterize *P. inconspicua*.

Distribution: 43, 49-50, 56, 58-62, 66-69.

Genus *PLANODISCORBIS* Bermudez, 1952

173. *Planodiscorbis rarescens* (Brady)

Discorbina rarescens Brady, 1884, p. 651, pl. xc, figs. 2-4.

Discorbis rarescens (Brady). Parr 1945, p. 210.

Planodiscorbis rarescens (Brady). Bermudez 1952, p. 40.

Occurs in small numbers in Bass Strait and Lower Bay stations. Parr recorded it from Barwon Heads.

Distribution: 56, 58-59, 61, 66, 68.

174. *Planodiscorbis grossepunctatus* (Parr)

Discorbis grossepunctatus Parr, 1945, p. 210, pl. x, figs. 4a-c.

One specimen only, from Lonsdale Bight (58-C7) corresponds with Parr's figure in most respects, except that it has six chambers instead of four in the final whorl and is about 0.6 the size. The addition of one chamber 'much larger than the others' would probably eliminate this difference. Parr noted that this species is similar to '*Discorbis*' *rarescens* in being involute on the dorsal side and evolute on the ventral, thus placing it in *Planodiscorbis*.

Genus *PLANULINOIDES* Parr, 1941

175. *Planulinoides biconcavus* (Jones and Parker)

Discorbina biconcava Jones and Parker, 1862, p. 201; Parker and Jones 1865, p. 422, pl. xix, figs. 10a-b; Brady 1884, p. 653, pl. xci, figs. 2-3; Chapman 1909, p. 136.

Planulinoides biconcavus (Jones and Parker). Parr 1941, p. 305, text-figs. a-c; Loeblich and Tappan 1964, p. C584, fig. 458, 4-6.

Discorbinella biconcava (Jones and Parker). Parr 1945, p. 211.

A very common species in Bass Strait and the Lower Bay, occurring in nearly all the stations. Specimens clearly show the discorbine apertural flaps which, together with the peripheral aperture and bicarinate form characterize this species. Todd (1965) has recorded this species from tropical deep-water localities, but has been unable to confirm the existence of these flaps. However, her figure (pl. 11, fig. 1) shows a form which is comparatively thin and parallel-sided, whereas Bass Strait specimens develop a flaring growth in width in the later chambers, giving the characteristic concavity to the sides of the test. *P. concavus* is locally a shallow-water species, and it appears likely that the deep-water specimens of the

'Albatross' collections are specifically if not generically distinct.

Distribution: 42-43, 49-50, 56, 58-62, 66-69.

176. *Planulinoides planoconcavus* (Chapman, Parr and Collins)

Planulina biconcava (Jones and Parker) var. *planoconcava* Chapman, Parr and Collins ms. (in Parr 1932, p. 232, pl. xxii, figs. 34a-c).

Discorbis planoconcavus (Chapman Parr and Collins), Chapman, Parr and Collins 1934, p. 561, pl. ii, figs. 40a-c.

Discorbinella planoconcava (Chapman Parr and Collins), Parr 1945, p. 211, pl. xi, figs. 1-2; Albani 1968, p. 108.

Frequent at Barwon Heads (56) and occurring at other Bass Strait and Lower Bay stations, but not nearly as common as *P. biconcavus*, from which it differs only in its asymmetrical development.

Distribution: 50, 56, 58-59, 61, 68.

177. *Planulinoides disparilis* (Heron-Allen and Earland)

Discorbina disparilis Heron-Allen and Earland, 1922, p. 205, pl. vii, figs. 20-22.

Discorbis disparilis (H.-A. and E.), Parr 1932, p. 230, pl. xxii, figs. 32a-c.

Discorbinella disparilis (H.-A. and E.), Parr 1945, p. 212.

This species occurs frequently at Barwon Heads (56-C8), and its distribution extends into the Lower Bay. Though its periphery is not so obviously bicarinate as in the previous species, it is nevertheless truncate with a shallow concavity between the two rounded edges in which the peripheral aperture is sited, and should therefore be referred to *Planulinoides* rather than to the single-keeled *Discorbinella*.
Distribution: 50, 56, 58-61, 66, 68.

Genus PSEUDOHLENINA gen. nov.

Test trochospiral, biconvex, spiral side more strongly convex with all chambers visible, umbilical side flatter, deeply umbilicate and showing only the last whorl. Chambers inflated, usually six in the last whorl, periphery broadly rounded and lobulate. Sutures depressed, almost radial on umbilical side, oblique and somewhat sinuate on the spiral side. Primary aperture umbilical with a small projecting flap,

secondary sutural apertures developed on spiral side, narrowly triangular in shape and extending for about half the length of the chamber along the spiral suture and for a short distance along the septal suture. Obsolete sutural apertures indicated by a short, narrow imperforate lip occur in the radial sutures of the umbilical side about halfway to the periphery, but do not open to the interior. Wall hyaline, radial and coarsely perforate, except for a small clear area on the distal face of the final chamber.

Genoholotype: Valvulineria collinsi (Parr)

This genus is erected to accept a discorbinine species having supplementary sutural apertures on the spiral side, with an indication of obsolete sutural slits on the umbilical side. The generic name does not imply a close relationship with *Helenina* Saunders 1961, but rather indicates a similarity in the possession of sutural supplementary apertures. It differs from that genus in being coarsely instead of finely perforate, the primary aperture does not extend on to the spiral side and the sutural apertures are separate rather than continuations of the primary aperture. Also, the well developed radial slits on the umbilical side of *Helenina* are absent or represented only by an obsolete lip. The genotype *Helenina andersoni* (Warren) is confined to a salt marsh habitat in Louisiana and the West Indies, whereas the present form is found only in fully marine conditions.

178. *Pseudohelenina collinsi* (Parr)

Pl. 2, figs. 26a-c

Discorbis collinsi Parr, 1932, p. 230, pl. xxii, figs. 33a-c.

Valvulineria collinsi (Parr), Parr 1945, p. 212.

Descriptions emended as above, with the characteristics of the genus. Fresh specimens usually have all but the last one or two of the supplementary apertures closed off by later deposition. Fossil specimens from the Pleistocene shell sands of Goose Lagoon, W. Vict., show clearly the sutural slits opening into the chambers, presumably because of leaching and solution of the thin infilling. This observation prompted re-examination of recent specimens from the present collections, in which the spe-

cies is common, resulting in the recognition of characters which preclude reference to *Valvulineria* and do not appear to be provided for in any described genus. Parr's figures show a suggestion of the sutural slits, but (as the writer is aware, having drawn the originals) they were not recognized as features of any importance in the classification of forty years ago.

Figured specimen from Goose Lagoon, Reg. No. G2138.

Distribution: 43, 56, 59-62, 66-68.

GENUS TORRESINA Parr, 1947

179. *Torresina involuta* (Sidebottom)

Discorbina involuta Sidebottom, 1918, p. 225, pl. vi, figs. 16-17.

Discorbinella involuta (Sidebottom). Parr 1945, p. 212.

Torresina involuta (Sidebottom). Parr 1947, p. 131, pl. i, figs. 2a-c, 3a-c, text-fig. 2.

This species is not infrequent at Barwon Heads and occurs in a few stations in the Lower Bay. Loeblich and Tappan (1964) place this genus in the Epistomariidae, a family defined inter alia as possessing supplementary chamberlets on the umbilical side. The only reference to supplementary chamberlets in *Torresina* derives from one specimen only, an unusually large specimen of *T. haddoni* from Trinity Inlet, Cairns, Qd., which develops structures on the last two chambers which were not found in the larger series of specimens of that species from Raine Is. These structures, however, appear to be only an enlarged and recurved modification of the ventral apertural flaps which occur in other species of the genus, rather than true chamberlets as in *Epistomaria*.

Considering the more or less truncate periphery, the peripheral aperture and the ventral flaps, the only major respect in which this genus differs from *Planulinoides* is in the incomplete subdivision of the chambers by secondary septa. It is therefore concluded that its proper place is in the Discorbinace together with *Planulinoides* and *Discorbinella*.

Distribution: 50, 56, 59, 61, 68.

Subfamily BAGGININAE

Genus BAGGINA Cushman, 1926

180. *Baggina phillipinensis* (Cushman)

Palvinulina phillipinensis Cushman, 1921, p. 331, pl. lviii, figs. 2a-c.

Cancris phillipinensis (Cushman). Parr 1939, p. 69, pl. (unnumbered), figs. 18a-c.

Baggina phillipinensis (Cushman). Parr 1945, p. 213; Albani 1968, p. 110.

Four specimens from Barwon Heads and single specimens from seven stations in Bass Strait and the Lower Bay. They are small compared with tropical specimens, but appear to be conspecific.

Distribution: 50, 56, 58, 60-61, 68-69.

Genus CANCRIS de Montfort, 1808

181. *Cancris auriculus* (Fichtel and Moll)

Nautilus auricula Fichtel and Moll, 1803, pp. 108, 110, pl. xx, figs. a-f.

Cancris auriculus (Fichtel and Moll). Cushman and Todd 1942, p. 74, pl. 18, figs. 1-11, pl. 23, fig. 6.

Three specimens from Barwon Heads and one each from Areas 50 and 62 are small but otherwise typical of this cosmopolitan species.

Genus RUGIDIA Heron-Allen and Earland, 1928

182. *Rugidia simplex* sp. nov.

Pl. 2, figs. 27a-c

Test irregularly globose, consisting of a proloculus and 3-4 chambers in roughly trochospiral arrangement. Dorsal side coarsely pored and in a few examples obscured by irregular rugose thickening, sutures slightly curved and nearly flush. Ventral side very finely perforate and comparatively clear, no discernible aperture, sutures radial and slightly depressed. Wall thick, hyaline and radial in structure.

Holotype from 56-C8, Reg. No. G2139. Major diameter 0.60 mm, thickness 0.50 mm.

This peculiar species is tentatively referred to *Rugidia* on account of its few, thick-walled chambers and apparent cruciform arrangement, which on sectioning is seen to be trochospiral. The clear ventral area suggests a relationship with the Baggininae. The specimen figured is one of the more regularly formed. 21 specimens were found at Barwon Heads, and one or two in Areas 59-60, 62, 66 and 68.

Genus VALVULINERIA Cushman, 1926

183. *Valvulineria minutissima* sp. nov.

Pl. 2, figs. 28a-c

Test small, trochospiral, plano-convex to unequally biconvex and varying considerably in thickness, sub-circular in outline, periphery rounded and slightly lobulate, 7-9 chambers in the last whorl. Dorsal side strongly convex, all chambers visible, sutures recurved and slightly depressed. Ventral side flat to slightly convex, sutures depressed and slightly recurved, inner ends of chambers extend toward umbilicus forming a rudimentary flap. Umbilicus shallow and infilled with fine papillae which extend to a varying degree over the inner ends of the chambers. Wall polished and finely pored, transparent on inner side of chambers with pores more closely spaced toward periphery on both dorsal and ventral sides. Wall structure hyaline, radial and monolamellar.

Holotype from 5-C1, Reg. No. G2140. Greatest diameter 0.29 mm, thickness 0.13 mm.

The generic position of this small species is somewhat doubtful. It has been placed in *Valvulineria* because of its monolamellar wall, rounded periphery and rudimentary umbilical flap, though the papillate umbilical area is atypical. It has a discontinuous distribution in shallow water, occurring in Areas 5 and 6 at the N. end of Port Phillip, in Swan Bay (49) and in the Barwon estuary (56-C9).

184. *Valvulineria victoriensis* sp. nov.

Pl. 3, figs. 29a-c

Test trochospiral, periphery rounded and lobulate. Dorsal side nearly flat, all chambers visible, 7-9 in the last whorl, sutures slightly recurved and depressed. Ventral side more convex, with depressed umbilicus, sutures nearly radial and depressed. Inner ends of chambers extended to form flaps which fill the umbilicus and are returned toward the periphery to cover the inner ends of the sutures, forming a stellate pattern. Aperture obscure, presumably below umbilical flaps. Wall finely and closely pored, with clear transparent areas bordering the septal sutures in immature

specimens. Wall structure hyaline, radial and monolamellar.

Holotype from 49-C5, Reg. No. G2141. Greater diameter 0.43 mm, thickness 0.20 mm.

This species has much the same shallow-water distribution as the last, occurring at the same localities and also at Kirk Point (16). Its generic affinities are clearer, due to the well-developed apertural flaps which fill the shallow umbilicus and the inner ends of the depressed sutures.

Distribution: 5-6, 16, 49, 56.

Family SIPHONINIDAE

Genus SIPHONINA Reuss, 1850

185. *Siphonina tubulosa* Cushman

Siphonina tubulosa Cushman, 1924, p. 40, pl. 13, figs. 1-2; Parr 1950, p. 362; Collins 1958, p. 413.

Frequent at Barwon Heads but rare elsewhere, in Bass Strait and Lower Bay stations only.

Distribution: 50, 56, 60-61, 68.

Superfamily SPIRILLINACEA

Family SPIRILLINIDAE

Subfamily SPIRILLININAE

Genus SPIRILLINA Ehrenberg, 1843

186. *Spirillina vivipara* Ehrenberg

Spirillina vivipara Ehrenberg, 1843, p. 442, pl. iii, sec. 7, fig. 41; Parr 1950, p. 347; Collins 1958, p. 399; Albani 1968, p. 110.

This cosmopolitan species is fairly rare in the collections, occurring at two Bass Strait and four Lower Bay stations.

Distribution: 56, 61, 66, 68.

187. *Spirillina inaequalis* Brady

Spirillina inaequalis Brady, 1879 etc. (1879), p. 278, pl. viii, fig. 25; Parr 1945, p. 199; 1950, p. 350.

This is the commonest spirilline in Victorian coastal waters, occurring in most of the Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58-59, 61-62, 66, 68.

188. *Spirillina pectinimarginata aspinosa* Parr

Spirillina pectinimarginata Chapman Parr and Collins var. *aspinosa* Parr, 1950, p. 348, pl. xiii, figs. 7a-b.

One specimen was found at 68-158 off Rye. Parr described it from off Tasmania and stated that it occurred in the Victorian Miocene.

Genus *PLANISPIRILLINA* Bermudez, 1952189. *Planispirillina dimidiata* Wiesner

Spirillina dimidiata Wiesner, 1931, p. 128, pl. xxi, fig. 250; Parr 1950, p. 350, pl. xiii, figs. 15-16.

Two specimens from Barwon Heads (56-C8) agree with the figures of this species. Records are all from the Antarctic.

190. *Planispirillina denticulata* (Brady)

Spirillina limbata Brady var. *denticulata* Brady, 1884, p. 632, pl. lxxxv, fig. 17.

S. denticulogranulata Chapman, 1909, p. 133, pl. x, fig. 6.

S. denticulata Brady. Parr 1950, p. 351.

Planispirillina denticulata (Brady). Collins 1958, p. 399.

Specimens were found at three Bass Strait stations and four in the Lower Bay, but it was nowhere common.

Distribution: 50, 56, 58, 61, 66, 68.

Genus *TURRISPIRILLINA* Cushman, 1927191. *Turrispirillina depressa* Parr

Turrispirillina depressa Parr, 1950, p. 351, pl. xiii, figs. 17-18.

This small species, described from off Tasmania, occurs in Bass Strait and Lower Bay stations and is also found in the W. Bay. It occurs in some numbers on the muddy S. beach of Swan Bay (49-C6). Parr's record was from comparatively deep water, but the present evidence indicates that the species is well adapted to shallow stillwater conditions.

Distribution: 17, 26, 31, 49-50, 58, 60, 68-69.

Subfamily *PATELLININAE*Genus *PATELLINA* Williamson, 1858192. *Patellina corrugata* Williamson

Patellina corrugata Williamson, 1858, p. 46, pl. iii, figs. 86-89; Parr and Collins 1930, p. 90, pl. iv, figs. 1-5; Parr 1945, p. 91; 1950, p. 352; Collins 1958, p. 401.

Fairly rare at Barwon Heads and in five Lower Bay stations, single specimens at two stations in the W. Bay.

Distribution: 26, 31, 50, 56, 61-62, 68.

Superfamily *ROTALIACEA*Family *ROTALIIDAE*Subfamily *ROTALIINAE*Genus *AMMONIA* Brönnich, 1772193. *Ammonia aoteanus* (Finlay)

Pl. 3, figs. 30a-c

Streblus aoteanus Finlay, 1939 etc. (1940), p. 461.
Ammonia aoteanus (Finlay). Hedley, Hurdle and Burnett 1967, p. 47, pl. 11, figs. 4a-c, text-figs. 56-60.

This is the common form of *Ammonia* found in Victorian coastal, bay and estuarine waters, and previously cited by authors as *A. beccarii* (Linne). Compared with specimens of the latter species from the Adriatic it is a much simpler test, lacking the exogenous growth in the form of sutural beading dorsally and dentate edging to the ventral sutures which characterize *beccarii*. Local specimens vary in the degree of umbilical infilling from a completely open umbilicus to one almost entirely infilled with irregular pillars. New Zealand specimens appear to show similar variation, as illustrated by Hedley et al. (1967). One of the more infilled specimens is illustrated here.

Figured specimen from 16-C2, Reg. No. G2142. Diameter 0.69 mm, thickness 0.37 mm.

It is a euryhaline species, being common on the open coast and also in brackish estuarine waters where it is often the dominant species. It is widely distributed in Port Phillip, being present in nearly every station in the Lower Bay, central basin and the W. Bay N. of Kirk Point. The reason for its almost complete absence from Geelong Outer Harbour and Corio Bay is not apparent, since it is common in the less favourable environments of the central basin and the N. Areas near the mouth of the Yarra River, where foraminiferids are scarce and few in species.

Distribution: 2-3, 5-7, 10-13, 16-20, 22-23, 25, 31-33, 35-36, 38, 42, 44-45, 48-51, 53-56, 58-63, 66-69.

194. *Ammonia tepida* (Cushman)

Rotalia beccarii (Linne) var. *tepida* Cushman, 1926A, p. 79, pl. 1.

Streblus tepidus (Cushman). Collins 1958, p. 414.

This species occurs in small numbers on the W. coast of Port Phillip from Altona to Corio Bay, and in Swan Bay, mostly in shallow-water or littoral material. Specimens were compared with others obtained from Cushman's original Dry Tortugas material and were found to match very well. They are consistently smaller than adult specimens of *A. aoteanus* (0.3 to 0.35 mm diam.) and when compared with juveniles of similar size differ in their more distinct pore pattern, clear non-perforate margins along the inner edge of the chamber adjoining the spiral suture on the dorsal side, and in the absence of non-perforate edges and tips to the umbilical extensions of the chambers on the ventral side.

Distribution: 5-7, 16, 26, 28-31, 37, 42, 49.

Family ELPHIDIIDAE

Subfamily ELPHIDIINAE

Genus ELPHIDIUM de Montfort, 1808

This genus as earlier understood (Cushman 1939) has been subdivided by later authors into a number of genera which, in some cases at least, appear to be based on characteristics of doubtful value. For the purposes of this work the older usage has been followed, all species present being retained in *Elphidium*.

195. *Elphidium argenteum* Parr

Elphidium argenteum Parr, 1945, p. 216, pl. xii, figs. 7a-b.

Criboelphidium argenteum (Parr). Hedley, Hurdle and Burdett 1967, p. 48, pl. 12, figs. 2a-b.

Common in Bass Strait and in the Lower Bay, with a few specimens from the W. Bay. This species has been referred to *Criboelphidium* Cushman and Bronnimann by Hedley et al. (1967) on the grounds of possessing solid septal bridges instead of hollow retral processes, and a simpler canal system than *Elphidium* s. str. However, the definition of *Criboelphidium* (Loeblich and Tappan 1964) includes multiple apertures with areal as well as basal pores, of which the former do not occur in this species.

Distribution: 5, 10, 16, 18, 27-28, 30-32, 42-43, 56, 58-63, 68-69.

196. *Elphidium advenum* Cushman

Polystomella advena Cushman, 1922, p. 56, pl. 9, figs. 11-12.

Elphidium advenus (Cushman). Cushman 1939, p. 60, pl. 16, figs. 31-35.

E. advenum (Cushman). Parr 1945, p. 216; Albani 1968, p. 111, pl. 10, fig. 6.

This is the commonest species of *Elphidium* in the Survey area, occurring throughout Port Phillip and in the Bass Strait stations, usually in considerable numbers.

Distribution: all Areas providing samples, except 20-21, 23, 44, 52.

197. *Elphidium limbatum* (Chapman)

Polystomella macella (Fichtel and Moll) var. *limbata* Chapman, 1909, p. 142, pl. 10, figs. 9a-b.

Elphidium macellum (F. and M.) var. *limbatum* Chapman. Cushman 1939, p. 52, pl. 14, fig. 5.

This small but distinctive species is widely distributed in Port Phillip, from whence it was described, and also occurs in Bass Strait stations. It has little in common with *E. macellum* and is accordingly treated as a distinct species. Chapman's description is in error to the extent that the sutures are not limbate, but depressed and infilled with granular growth which obscures the retral processes in many specimens. The apparent limbate areas are in fact the clear inflated walls of the anterior part of the chambers. The periphery is slightly keeled as in Chapman's fig. 9a.

Distribution: 3, 5-7, 9-10, 12-13, 16-19, 22, 25-26, 29-32, 36-40, 45-46, 48, 50, 56, 58-63, 66-69.

198. *Elphidium selseyense* (Heron-Allen and Earland)

Polystomella striato-punctata (Fichtel and Moll) var. *selseyense* Heron-Allen and Earland, 1908 etc. (1909), p. 695, pl. 21, figs. 2a-c.

Elphidium selseyense (H.-A. and E.). Cushman 1939, p. 60, pl. 16, figs. 26-28.

Small thin-walled specimens with rounded and lobulate periphery, depressed umbilicus with a varying degree of pustular infilling, depressed sutures with very short retral processes and basal pored aperture are referred to this species. Comparison has been made with topotype specimens of *E. selseyense* and with Cuban specimens of *E. poeyana* d'Orbigny. The latter

species, which has been recorded from Australian waters (Albani 1968) is similar in general morphology to *E. selseyense*, but is distinguished by its possession of areal apertures in the form of large pores in the apertural face. This character has been used to distinguish *Criboelphidium* Cushman from *Cribrononion* Thalmann, the present specimens lacking an areal aperture coming within the definition of the latter genus. It appears to be a valid distinction, at least at the specific level.

Feyling-Hansen (1972) considers that this species (as *E. excavatum* Terquem forma *selseyense*) is confined to the boreal region, but it is noted that the authors of the species recorded it from the Indian Ocean and the Antarctic.

Distribution: 5-6, 10, 26, 55-56, 59, 63, 68, nowhere common.

199. *Elphidium simplex* Cushman

Elphidium simplex Cushman, 1932 etc. (1933), p. 52, pl. 12, figs. 8-9; 1939, p. 62, pl. 17, fig. 10; Albani 1968, p. 113, pl. 10, fig. 4.

Elphidium sp. cf. *simplex* Cushman. Parr 1945, p. 216, pl. ix, fig. 8.

This species is well distributed in Port Phillip except in the central basin, and was also found in Bass Strait stations. Frequent in the stations in which it occurs.

Distribution: 3, 5-7, 9-10, 13, 16-18, 22, 26-27, 31, 36, 49-50, 55-56, 58-59, 61-62, 66, 69.

200. *Elphidium evolutum* (Chapman)

Polystomella striatopunctata (Fichtel and Moll) var. *evoluta* Chapman, 1913, p. 173, pl. 16, fig. 9.

This small species was described from the Tertiary of Victoria (Mallacoota Bores). The present specimens correspond with Chapman's description and figure in all respects except size, with a maximum diameter of 0.29 mm as against the original of 0.446 mm. This is not considered to justify any distinction even at the subspecific level. The evolute character, unusual in this genus, occurs only because the inward edges of the chambers do not extend over the umbilicus, thus exposing the earlier whorls which, however, are usually obscured

by granular growth. There is no tendency to uncoil as implied by Cushman in considering this species to be a possible precursor of *Ozawaia*, which develops a uniserial stage.

It has a scattered distribution in the N. Areas of Port Phillip, and does not extend into Corio Bay, the Lower Bay or Bass Strait. Distribution: 5-7, 10-13, 16-19, 22-23, 30, 32-33, 35-36, 47, 53-55.

201. *Elphidium crispum* (Linne)

Nautilus crispus Linne, 1758, p. 709.

Elphidium crispum (Linne). Cushman 1939, p. 50, pl. 13, figs. 17, 21; Parr 1943, p. 20; Albani 1968, p. 111, pl. 10, fig. 7.

Specimens with a prominent glassy umbo are referred with some doubt to this cosmopolitan species. They are smaller than Mediterranean specimens but match the smaller specimens of this species from a N. Atlantic dredging. Confined to Bass Strait and Lower Bay stations.

Distribution: 56, 58-60, 66, 68-69.

202. *Elphidium macellum* (Fichtel and Moll)

Nautilus macellus Fichtel and Moll, 1798, p. 66, pl. 10, figs. h-k.

Polystomella macella (F. and M.). Chapman 1909, p. 141.

Elphidium macellum (F. and M.). Cushman, 1939, p. 51, pl. 14, figs. 1-3, pl. 15, figs. 9-10; Parr 1945, p. 217; 1950, p. 372.

Specimens with depressed and papillate umbilicus are referred with equal doubt to this often cited species. They are small compared to Mediterranean specimens and vary considerably in degree of compression, but otherwise appear to be similar. Distribution is general throughout the Survey area, except for some of the more barren stations of the central Bay. Distribution: 5-7, 9-13, 16-19, 22, 25-28, 30-33, 36-40, 42-43, 45-50, 55-56, 58-63, 67-69.

203. *Elphidium sculpturatum* Cushman

Elphidium sculpturatum Cushman, 1936A, p. 84, pl. 15, figs. 2a-b.

This species was described from material dredged by the writer off Black Rock, Port Phillip, (Area 13) in the late 1920s, and does not appear to have been recorded since Cush-

man's description. Specimens from the type sample have a distinctive chalk-white appearance which emphasizes the bold modelling of septal ridges and retral processes.

The species occurs mainly in the N. half of Port Phillip where it is a common species, together with Swan Bay, Barwon River (C9) and a few isolated occurrences in the Lower Bay.

Distribution: 5-6, 10-12, 16-19, 22, 25-33, 36, 49, 51, 55-56 (C9), 61, 63, 66.

204. *Elphidium granulatum* sp. nov.

Pl. 3, figs. 33a-c

Test small, planispiral with up to 13 inflated chambers in the last whorl, periphery broadly rounded and lobulate, sutures depressed with short sutural bridges, umbilicus depressed. Surface hispid with short granular outgrowths which occur both on the chamber and in the sutures and umbilicus, completely masking the retral processes in earlier chambers. Aperture obscure, probably basal.

Holotype from 49-C5, Reg. No. G2145. Major diameter 0.33 mm, thickness 0.17 mm. This small species is restricted to Swan Bay (49) in the present material. It differs from *E. hispidulum* Cushman in being umbilicate rather than umbonate, and in lacking circumferential costae, and does not appear to have been previously described.

205. *Elphidium vitreum* sp. nov.

Pl. 3, figs. 35a-c

Test planispiral with up to 15 chambers in the last whorl, lenticular in edge view with bluntly angular periphery, sutures nearly flush, translucent, crossed by short processes forming a row of shallow pits into which large pores open. These pores which angle outwards toward the periphery are seen to have their origin in a thread-like septal canal which is visible through the translucent wall. Chamber walls polished and finely pored, umbo glassy and non-pored, aperture consisting of a row of pores at the base of the apertural face.

Holotype from 62-99, Reg. No. G2147. Major diameter 0.34 mm, thickness 0.17 mm.

This species occurs in small numbers at nine stations in the Lower Bay or just outside the Heads. Its sutural characteristics combined with its general morphology are distinctive. The largest specimen found, having several chambers missing, was 0.70 mm in maximum diameter. Distribution: 58, 60-62, 67-68.

206. *Elphidium articulatum* (d'Orbigny)

multicameratum subsp. nov.

Pl. 3, figs. 31a-b

Test planispiral with up to 17 chambers in the final whorl, periphery broadly rounded and somewhat lobulate (more so in smaller specimens), umbilicus depressed, chambers inflated, sutures depressed and crossed by short processes forming elliptical pits, wall finely porous and opaque, aperture consisting of a narrow slit at the base of the apertural face.

Holotype from 56-C9, Reg. No. G2143. Major diameter 0.68 mm, thickness 0.30 mm.

This subspecies has the general characteristics of *E. articulatum* but has many more chambers in the final whorl, up to 17 in comparison with 10. It was found at 12 stations scattered over the Survey, and was common at the shore stations of Altona Bay (5-C1) and the Barwon estuary (56-C9).

Distribution: 5, 19, 22-23, 26, 30, 33, 36, 39-40, 55-56 (C9), 58, 61.

207. *Elphidium earlandi* Cushman *avalonense* subsp. nov.

Pl. 3, figs. 32a-b.

Test small, planispiral, strongly compressed, periphery bluntly keeled, chambers inflated with finely-pored and translucent wall, up to 13 in the last whorl. Sutures depressed, crossed by 7-8 retral processes taking up from 0.3-0.5 the width of chambers, umbilicus depressed, aperture consisting of a few pores at the base of the apertural face.

Holotype from 26-C3, Reg. No. G2144. Major diameter 0.39 mm, thickness 0.13 mm.

This species combines the extreme compression of *E. macellum* with inflation of the anterior part of the chamber as in *E. advenum*. It is close to *E. earlandi* s. str. but differs in

having more chambers in the final whorl, fewer retral processes and in being keeled throughout. The differences are not major, and it has therefore been given subspecific status. It was found at six stations in the SW. part of Port Phillip in addition to the type locality at Avalon Beach, Corio Bay.

Distribution: 26-28, 39, 49, 63, 68.

208. *Elphidium gunteri* Cole *corioense*
subsp. nov.

Pl. 3, figs. 34a-b.

Test fairly small, planispiral with up to 14 chambers in the final whorl, sides slightly convex, periphery broadly rounded and becoming more angular and slightly lobulate in the later chambers which are somewhat inflated. Sutures depressed in the last 3-4 chambers, elsewhere flush, with very short retral processes forming an irregular row of rounded pits which lie anterior to the septum, which is seen as a pale band between the lumen of the previous chamber and the row of pits. Central area flush and marked by a group of rounded papillae which in some cases coalesce. Aperture consists of a row of small pores at the base of the apertural face.

Holotype from 39-313, Reg. No. G2146. Major diameter 0.36 mm, thickness 0.18 mm.

This form is close to *E. gunteri*, described from the Pliocene of Florida, but differs in the less regular sutural pits, more angular periphery on later chambers, slightly smaller average size and in the distinctive appearance caused by the edge of the septum showing through the transparent wall behind the row of pits. Specimens were found in 18 stations in Port Phillip and Bass Strait.

Distribution: 5, 9-10, 12, 16-17, 30-32, 38-40, 56, 58-60, 66, 68.

Subfamily NOTOROTALIINAE

Genus PARRELLINA Thalmann, 1951

209. *Parrellina verriculata* (Brady)

Polystomella verriculata Brady, 1879 etc. (1881), p. 66; 1884, p. 738, pl. ix, figs. 12a-b; Chapman 1909, p. 142, pl. 10, fig. 10.

Elphidioides verriculatus (Brady). Parr 1950, p. 374, pl. xv, fig. 17 (non *Elphidioides* Cushman 1945).

Rare juvenile specimens were found at seven stations in Bass Strait or just inside Port Phillip Heads. It is more commonly found in deeper water. Distribution: 56, 58-60, 66.

Genus NOTOROTALIA Finlay, 1930

210. *Notorotalia clathrata* (Brady)

Rotalia clathrata Brady, 1884, p. 709, pl. cvii, fig. 8. *Notorotalia clathrata* (Brady). Finlay 1939 etc. (1939), p. 517; Parr 1950, p. 374.

This species, described from Bass Strait, was fairly common in material from Lower Bay and Bass Strait stations.

Distribution: 56, 58-59, 61-62, 66-69.

Superfamily GLOBIGERINACEA

Family GLOBOROTALIDAE

Subfamily GLOBOROTALIINAE

Genus GLOBOROTALIA Cushman, 1937

211. *Globorotalia hirsuta* (d'Orbigny)

Rotalina hirsuta d'Orbigny, 1839B, p. 131, pl. 1, figs. 37-39.

Globorotalia hirsuta (d'Orbigny). Parker 1962, p. 238, pl. 5, fig. 12.

Occurs generally in Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58-62, 66, 68-69.

212. *Globorotalia truncatulinoides*
(d'Orbigny)

Rotalina truncatulinoides d'Orbigny, 1839B, p. 132, pl. ii, figs. 25-27.

Globorotalia truncatulinoides (d'Orbigny). Cushman 1918 etc. (1931), p. 87, pl. 17, figs. 4a-c; Parr 1950, p. 367.

Occurs generally in Bass Strait and Lower Bay stations and as far N. as Area 43. Specimens are small but characteristic.

Distribution: 43, 50, 56, 58-62, 66, 68.

213. *Globorotalia inflata* (d'Orbigny)

Globigerina inflata d'Orbigny, 1839B, p. 134, pl. ii, figs. 7-9; Parr 1945, p. 215; 1950, p. 366.

Globorotalia inflata (d'Orbigny). Albani 1968, p. 113; 1970, p. 73 (Table 1).

Rather more common than the other two species of the genus and having the same general distribution.

Distribution: 42-43, 50, 56, 58-62, 66, 68-69.

Family GLOBIGERINIDAE

Subfamily GLOBIGERININAE

Genus GLOBIGERINA d'Orbigny, 1826

214. *Globigerina bulloides* d'Orbigny

Globigerina bulloides d'Orbigny, 1826, p. 277, Modèles No. 17; Parr 1945, p. 215; 1950, p. 365; Albani 1968, p. 114.

Present in small numbers in Bass Strait and Lower Bay stations.

Distribution: 43, 50, 56, 58-63, 66, 68.

Genus GLOBIGERINOIDES Cushman, 1927

215. *Globigerinoides trilobus* (Reuss)

Globigerina triloba Reuss, 1850, p. 374, pl. 47, figs. 11a-c.

Globigerinoides trilobus (Reuss) forma typica. Boltovskoy 1969, p. 252, pl. 2, fig. 9.

Present in small numbers in Bass Strait and Lower Bay stations.

Distribution: 43, 50, 56, 58-61, 66, 68.

216. *Globigerinoides ruber* (d'Orbigny)

Globigerina rubra d'Orbigny, 1839A, p. 82, pl. iv, figs. 12-14.

Globigerinoides rubra (d'Orbigny). Cushman 1927, p. 87.

G. ruber (d'Orbigny). Parr 1945, p. 215; Albani 1968, p. 114.

Rare specimens were found at five stations in Bass Strait and the Lower Bay.

Distribution: 43, 56, 58, 60, 66.

Subfamily ORBULININAE

Genus ORBULINA d'Orbigny, 1839A

217. *Orbulina universa* d'Orbigny

Orbulina universa d'Orbigny, 1839A, p. 3, pl. i, fig. 1; Parr 1945, p. 215; 1950, p. 366; Albani 1968, p. 115.

Common in Bass Strait material and occurring also in the Lower Bay. Specimens were small and many apparent juveniles were present.

Distribution: 43, 50, 56, 58-62, 66, 68-69.

Superfamily ORBITOIDACEA

Family GLABRATELLIDAE

Genus GLABRATELLA Dorrén, 1948

218. *Glabratella pulvinata* (Brady)

Discorbina pulvinata Brady, 1884, p. 650, pl. lxxxix, figs. 8-9.

Discorbis pulvinatus (Brady). Parr 1945, p. 210.

Glabratella pulvinata (Brady). Loeblich and Tappan 1964, p. C589, figs. 464, 2a-c.

Fairly common at Barwon Heads and found in other Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58, 60-61, 66, 68.

219. *Glabratella australensis* (Heron-Allen and Earland)

Discorbis australensis Heron-Allen and Earland, 1932, p. 416; Parr 1945, p. 209.

Glabratella australensis (H-A. and E.). Albani 1968, p. 110.

Fairly common in Bass Strait and the Lower Bay. Recorded from Bass Strait by Brady (as *Discorbina pileolus*).

Distribution: 43, 50, 56, 58-61, 66-69.

220. *Glabratella patelliformis* (Brady)

Discorbina patelliformis Brady, 1884, p. 647, pl. lxxxix, figs. 1a-c.

Discorbis patelliformis (Brady). Parr 1945, p. 209.

Glabratella patelliformis (Brady). Albani 1968, p. 110, pl. 9, figs. 11, 15.

This species is of fairly rare occurrence at Barwon Heads and at two stations in the Lower Bay. It has a wide distribution in the Australian region.

Distribution: 50, 56, 61.

Genus ANGULODISCORBIS Uchio, 1953

221. *Angulodiscorbis pyramidalis* (Heron-Allen and Earland)

Discorbis pyramidalis Heron-Allen and Earland, 1924A, p. 634, pl. 37, figs. 56-61.

Rare specimens from Bass Strait and Lower Bay stations are referred to this species with some degree of doubt. Two large specimens from Area 50 show the concave faces and sharp angles which characterise this species, though not so markedly as in tropical specimens with which they were compared. Smaller specimens tend to have rounded angles, though still squarish in cross-section. A larger series of specimens might resolve this point.

Distribution: 50, 56, 58, 60-61, 66, 68.

Genus HERONALLENIA Chapman and Parr, 1931

222. *Heronallenia lingulata* (Burrows and Holland)

Discorbina lingulata Burrows and Holland, 1895, p. 297, pl. vii, figs. 33a-c.

Heronallenia lingulata (B. and H.). Chapman and Parr 1931, p. 236, pl. ix, fig. 6; Parr 1945, p. 211.

Frequent at Barwon Heads and occurring in small numbers in other Bass Strait and Lower Bay stations.

Distribution: 43, 50, 56, 58-59, 61, 66, 68.

223. *Heronallenia translucens* Parr

Heronallenia translucens Parr, 1945, p. 211, pl. ix, figs. 15-16.

Frequent at Barwon Heads, with a limited distribution at other Bass Strait and Lower Bay stations. So far this species appears to be confined to Victorian coastal waters.

Distribution: 56, 58, 61, 66, 68.

Family ROSALINIDAE

Genus ROSALINA d'Orbigny, 1826

224. *Rosalina australis* Parr

Discorbis australis Parr, 1932, p. 227, pl. 22, figs. 31a-c; 1945, p. 209.

Rosalina australis (Parr). Albani 1968, p. 109, pl. 9, fig. 8.

Common in Bass Strait stations and in the Lower Bay.

Distribution: 42, 50-51, 56, 58-62, 66-69.

225. *Rosalina anglica* (Cushman)

Discorbis globularis (d'Orbigny) var. *anglica* Cushman, 1918 etc. (1931), p. 23, pl. 4, figs. 10a-c; Parr 1945, p. 209, pl. ix, figs. 11a-c.

Rosalina anglica (Cushman). Albani, 1968, p. 109, pl. 9, fig. 4.

Occurs in a number of Bass Strait and Lower Bay stations, but is nowhere common.

Distribution: 50, 56, 58-61, 63, 68.

226. *Rosalina kennedyi* (Parr)

Discorbis kennedyi Parr, 1945, p. 209, pl. ix, figs. 12a-b, 13a-b.

Not uncommon in Bass Strait beach stations, with a few specimens from the Lower Bay. The apertural flap is not well developed in this species, but can be seen as a narrow imperforate lip arching over the aperture from the umbilicus to about halfway toward the periphery. It is clearly not a *Discorbis* in the present restricted sense, and appears to be best placed in *Rosalina*.

Distribution: 56, 58-59, 61, 68.

227. *Rosalina pustulata* (Heron-Allen and Earland)

Discorbina pustulata Heron-Allen and Earland, 1913, p. 129, pl. 12, figs. 5-7; Sidebottom 1918, p. 255, pl. vi, figs. 9-11.

Two specimens were found in Areas 56 and 68. They are closer to Sidebottom's figure than to the original, the pustules on the dorsal side being closely spaced except toward the edges. However, the difference does not appear to warrant separation. Sidebottom's specimens were from the E. coast of Australia.

228. *Rosalina coronata* (Heron-Allen and Earland)

Discorbis coronata Heron-Allen and Earland, 1932, p. 416, pl. xiv, figs. 25-30.

Discorbis coronatus (Heron-Allen and Earland). Parr 1950, p. 355, pl. xiv, fig. 3.

Six specimens from Barwon Heads and the Lower Bay correspond with the description of this species. Parr recorded it from off Tasmania, the original record being from the Falkland Is.

Distribution: 50, 56, 68.

229. *Rosalina bertheloti* d'Orbigny

Rosalina bertheloti d'Orbigny, 1839B, p. 135, pl. i, figs. 28-30; Albani 1968, p. 109, pl. 8, figs. 19-20, 25-26.

Discorbis bertheloti (d'Orbigny). Parr 1945, p. 210; 1950, p. 355.

Specimens were found in eleven Bass Strait and Lower Bay stations. They are similar to Albani's figs. 25-26.

Distribution: 50, 56, 58-59, 61-62, 66-68.

230. *Rosalina parri* sp. nov.

Pl. 3, figs. 36a-c

Discorbis williamsoni Chapman and Parr ms. Parr 1932, p. 226, pl. xxi, fig. 25; 1945, p. 210, pl. x, figs. 3a-b (non *Discorbis williamsoni* Chapman and Parr, 1937, p. 105, pl. 21, fig. 25).

Test sub-circular to elliptical, spiral side low-convex with strongly arcuate chambers, usually three in the last whorl, sutures broad, limbate and flush, periphery sharply keeled, not lobulate. Umbilical side slightly concave with deep, stellate open umbilicus, chambers sub-triangular, surface radially-grooved in varying degree, interspaces forming low ridges ending in clear

mamillate protuberances at the umbilicus, apertures on both sides of a broad apertural flap. Surface highly polished, finely and closely perforate on spiral side, clear and sparsely perforate on umbilical side.

Holotype: Parr's specimen fig. 3a-b (1945). *Plesiotype* (illustrated) from 58-C7, Reg. No. G2148.

Chapman and Parr's rather poor figure of "*Discorbis*" *williamsoni* shows a test with lobulate periphery and 5.5 chambers in the last whorl, which agrees with Williamson's figure of *Rotalina nitida* (re-named by Chapman and Parr) and with British specimens from the Pliocene of St. Erth, Cornwall. It also agrees with specimens identified in the present work as *Rosalina williamsoni* (C. and P.) but considered to be distinct from the present form.

R. parri differs from *R. williamsoni* in having fewer and more arcuate chambers in the final whorl, broad limbate sutures, entire and non-lobulate periphery and radial grooving on the umbilical side, the latter feature being evident only in the larger specimens. Parr's fig. 3 shows these features well, except for radial grooving which is not present in all specimens. Distribution: 31, 50, 58-59, 62, 66, 68.

231. *Rosalina williamsoni* (Chapman and Parr)

Rotalina nitida Williamson, 1858 (non *R. nitida* Reuss, 1844).

Discorbis williamsoni Chapman and Parr, 1937, p. 105, pl. xxi, fig. 25.

Specimens from the Lower Bay and Bass Strait have 4-5.5 chambers in the last whorl, a lobulate periphery, narrow or slightly depressed sutures and a stellate umbilicus with clear mammillar blebs at the chamber apices, and as noted above are similar to British specimens of this species. The generic characters are those of *Rosalina* rather than of *Discorbis* in the present restricted sense.

Distribution: 50, 56, 59, 61, 68.

Genus TRETOMPHALUS Moebius, 1880

There is considerable doubt as to the status of this genus (Todd 1971) and its relationship with *Cymbaloporetta* Cushman. Two forms

occur in the present collections which are referable to described species, and it appears preferable to continue to refer them to *Tretomphalus* until the biological relationships in this group are more clearly established.

232. *Tretomphalus concinnus* (Brady)

Discorbina concinna Brady, 1884, p. 646, pl. xl, figs. 7-8.

Cymbalopora bulloides d'Orbigny. Earland 1902, pp. 309-321, pl. 16.

Tretomphalus concinnus (Brady). Cushman 1934, p. 96.

Tretomphalus bulloides (d'Orbigny) *concinnus* form, Todd 1971, p. 166, pl. 1, figs. 1-2, 4.

Specimens with float chambers were not uncommon in Bass Strait beach sands and were taken by the writer in a plankton haul in Swan Bay (49). They were compared with specimens from a portion of Earland's original material from Corny Point, S. Aust. and are considered to be conspecific. Specimens of the *Rosalina*-stage were found in both Bass Strait and Lower Bay stations.

Distribution: 49, 56, 58, 62.

233. *Tretomphalus planus* Cushman

Tretomphalus planus Cushman, 1934, p. 94, pl. 11, fig. 11, pl. 12, figs. 18-22.

Tretomphalus bulloides (d'Orbigny) *planus* form, Todd 1971, p. 166.

Specimens with float chambers were found in Bass Strait shore sands, together with the acervuline early stage which was also found in Lower Bay dredgings. One specimen with float chamber was taken in the plankton haul referred to above. The acervuline stage showed four chambers in the latest whorl, as did the pelagic specimens after removal of the float chamber.

It may be noted that, in spite of Earland's assertion that his Corny Point specimens were all of the 'Discorbine' variety (1902, p. 318), the material in fact contains a small proportion of individuals having an acervuline early stage and considered to be referable to the present species. In a random count of 380 specimens, five were acervuline, approximately 1.3%. They differ from the 'Discorbine' form in the reduced size of the *Rosalina*-stage and

in the subsequent development of one or more rings of acervuline chambers, but are otherwise very similar but slightly larger.

One of these specimens was of some interest in that the dorsal view shows two *Rosalina*-stages side by side, surrounded by rings of acervuline chambers, presumably caused by the accidental coalescence of two individuals at an early stage in development.

The presence of these acervuline specimens in what amounts to a reproductive swarm of *T. concinnus* gives support to Todd's view that they may be forms of a single species, considering the apparent simultaneity of their reaching the reproductive stage.

Distribution: 50, 56, 58-61, 68.

Family CIBICIDIDAE

Subfamily PLANULININAE

Genus PLANULINA d'Orbigny, 1826

234. *Planulina bassensis* sp. nov.

Pl. 3, figs. 37a-c

Test sub-circular, concavo-convex, evolute on the dorsal side, partially evolute on the ventral side. Dorsal side convex with slightly depressed and recurved sutures, limbate in early chambers, wall finely pored with scattered larger pores in later chambers. Ventral side concave with depressed umbilicus, chamber walls inflated and coarsely pored, sutures limbate and recurved, periphery bluntly keeled. Aperture interio-marginal extra-umbilical umbilical, formed by a narrow non-pored flap. Wall structure hyaline, radial and bilamellar. *Holotype* from 56-C8, Reg. No. G2149.

Greatest diameter 0.38 mm, thickness 0.12 mm.

Specimens were common at Barwon Heads and were found at nine other Bass Strait and Lower Bay stations. This small *Planulina* does not appear to correspond with any described species. Some specimens have a tendency toward irregularity in the last one or two chambers.

Distribution: 43, 50, 56, 58-62, 66.

Subfamily CIBICIDINAE

Genus CIBICIDES de Montfort, 1808

235. *Cibicides lobatulus* (Walker and Jacob)

Nautilus lobatulus Walker and Jacob, 1798, p. 39, pl. xii, fig. 36.

Cibicides lobatulus (Walker and Jacob). Cushman 1918 etc. (1931), p. 118, pl. 21, fig. 3.

Four specimens were found in Area 62 which closely match N. Atlantic specimens from Dog's Bay, Galway. It was not found elsewhere in the present collections.

236. *Cibicides mayori* (Cushman)

Truncatulina mayori Cushman, 1924, p. 39, pl. 12, figs. 3-4.

Cibicides mayori (Cushman). Cushman, Todd and Post 1954, p. 371, pl. 91, figs. 29-30; Todd 1965, p. 53, pl. 22, fig. 7.

Typical specimens of this flattened, irregular and sharply-keeled species were found at Barwon Heads, three stations in the Lower Bay and two in Geelong Outer Harbour.

Distribution: 27-28, 56, 58, 62, 68.

237. *Cibicides* sp. A

Pl. 3, figs. 38a-c, 39-40.

A common species in Bass Strait and Lower Bay stations assumes a variety of forms conforming to the diagnosis of more than one genus. The basic *Cibicides*-form is small (diam. 0.5 mm), planoconvex, umbilical side involute, high-domed and finely pored; the spiral side is evolute, flat and coarsely pored with a bluntly-keeled periphery. Aperture is arched and dorso-peripheral. Wall structure is hyaline, radial and bilamellar.

Some specimens continue with a regular *Cibicides*-like development, the later chambers on the umbilical side becoming more coarsely pored. Others have the last few chambers in a spiral series but irregular in shape, while others again develop biserially, approximating to *Dyo-cibicides*. Occasional specimens exhibit staggered uniserial growth with a terminal and areal lipped aperture.

The conspecificity of these forms is assumed, based on the similarity of the early spiral portion in each case, but needs confirmation through studies of the living organism. In view

of the doubts expressed by Nyholm (1961) and others as to the validity of some of the wild-growing genera of the Cibicidinae it appears best to leave identification open.

This may be the species referred by Parr (1945, p. 214) to *C. lobatulus* and mentioned as showing *Dyocibicides* and *Rectocibicides* forms. However, it is certainly not *C. lobatulus* as found in British waters.

Figured specimens from 58-C7, Reg. No. G2150. Distribution: 38, 43, 49-51, 56, 58-62, 66-69.

238. ***Cibicides phillipensis*** sp. nov.

Pl. 4, figs. 41a-c

Test trochospiral, plano-convex, bluntly-keeled and somewhat lobulate in the later chambers. Involute side is strongly convex and umbilicate with about seven chambers in the final whorl, wall coarsely perforate, sutures slightly depressed. Spiral side is flat, all chambers visible, sutures limbate and flush, wall coarsely perforate. Aperture is a short arched slit with a narrow imperforate lip, reaching periphery on the involute side, together with a very narrow slit along the spiral suture which is visible only in the last chamber. Wall structure hyaline, radial and bilamellar.

Holotype from 69-97, Reg. No. G2151. Greatest diameter 0.68 mm, thickness 0.42 mm. This species is distinguished from the foregoing by its consistently coarse-pored wall on the involute side, its generally larger size and its regular form. It is fairly common in Bass Strait and Lower Bay stations, and does not correspond with any described form known to the writer.

Distribution: 50, 56, 58-62, 67-69.

239. ***Cibicides watti*** sp. nov.

Pl. 4, figs. 42a-c

Test trochospiral, planoconvex to unequally biconvex, periphery bluntly-keeled, not lobulate. Umbilical side partially evolute showing the proloculus and first whorl, polished and finely perforate, sutures slightly depressed. Spiral side evolute, coarsely perforate and roughened by exogenous shell-growth, sutures

limbate, slightly raised and strongly recurved. Aperture peripheral, a small arched slit with a slight lip. Wall hyaline, radial and bilamellar. *Holotype* from 60-215, Reg. No. G2152. Greatest diameter 0.40 mm, thickness 0.15 mm.

This small and regularly-formed species is notable in being partially evolute on the umbilical side, but otherwise is a typical *Cibicides*, and does not appear to have been previously described. The specific name is given in honour of the first local worker in the Foraminiferida, Mr. H. Watts.

Distribution: 43, 50, 56, 58, 60-61, 66, 68-69.

Family PLANORBULINIDAE

Genus PLANORBULINA d'Orbigny, 1826

240. ***Planorbulina mediterranensis*** d'Orbigny

Planorbulina mediterranensis d'Orbigny, 1826, p. 280, No. 2, pl. 14, figs. 4-6; Parr 1945, p. 214; Albani 1968, p. 116, pl. 10, figs. 12, 16.

Common in Bass Strait and Lower Bay stations. Specimens compare well with Mediterranean specimens and lack the size, colour and development of exogenous ridges and nodes on the early chambers seen in *P. rubra* from the S. Aust. coast.

Distribution: 31, 50, 56, 58-62, 68-69.

241. ***Planorbulina*** sp. A

Pl. 4, figs. 43a-b

Test adherent, at first trochospiral, later irregular and spreading, chambers broad, low and meandering, wall in early chambers apparently pseudo-chitinous, later calcareous, coarsely perforate. Apertures peripheral and multiple, up to four per chamber, with a projecting lip and arranged in line along the leading edge of the chamber.

Figured specimen from 5-165, Reg. No. G2153. Length 1.1 mm.

This form differs from the common *P. mediterranensis* of this collection in its broad and low chamber shape and in its multiple apertures. It has not been identified with any described species, but as only one specimen was found it is recorded by open nomenclature.

Family ACERVULINIDAE

Genus ACERVULINA Schultze, 1854

242. *Acervulina inhaerens* Schultze

Acervulina inhaerens Schultze, 1854, p. 68, pl. vi, figs. 13-14; Chapman and Parr 1937, p. 122; Parr 1945, p. 214.

Common in Bass Strait and Lower Bay stations, with several records in the W. Bay to as far N. as Altona (5-C1). Both flattened and fusiform specimens were found, the latter enclosing an algal stem or similar rod-like substrate.

Distribution: 5, 16, 18, 27, 42-44, 50, 53, 56, 58-62, 66, 68-69.

Genus GYPSINA Carter, 1877

243. *Gypsina vesicularis* (Parker and Jones)

Orbitolina vesicularis Parker and Jones, 1860, p. 31, No. 5.

Gypsina vesicularis (Parker and Jones). Carter 1877, p. 173; Parr 1945, p. 214.

Common in Bass Strait and Lower Bay stations. Specimens range from roughly hemispherical to irregularly globular, as usual with this species.

Distribution: 43, 50-51, 56, 58-62, 66, 68-69.

Superfamily CASSIDULINACEA

Family ANNULOPATELLINIDAE

Genus ANNULOPATELLINA Parr and Collins, 1930

244. *AnnulopateLLina annularis* (Parker and Jones)

Orbitolina annularis Parker and Jones, 1860, pp. 30-31.

Patellina annularis (Parker and Jones). Parker and Jones 1865, p. 438.

AnnulopateLLina annularis (P. and J.). Parr and Collins 1930, p. 93, pl. iv, figs. 8-10.

Single specimens in plastogamie union were found at Barwon Heads (56) and Lonsdale Bight (58). The species is rare in Victorian waters.

Family CAUCASINIDAE

Subfamily FURSENKONINAE

Genus FURSENKOINA Loeblich and Tappan, 1961

245. *Fursenkoina schriebersiana* (Czjek)

Virgulina schriebersiana Czjek, 1848, p. 11, pl. xiii, figs. 18-21; Cushman 1937A, p. 13, pl. 2, figs. 11-20; Parr 1945, p. 205.

This species, characterised by its elongated chambers and reduced biserial portion, is fairly common in two locations within Port Phillip, Areas 61 and 68 off Rye and Geelong Outer Harbour. It occurs in small numbers at other stations on the E. and W. sides of the Bay, and very rarely in Bass Strait. Parr recorded it from Barwon Heads, but not from the off-shore Australian and Tasmanian stations of the B.A.N.Z.A.R. Expedition. It has been recorded in the Pacific from the Philippines and Fiji, but locally appears to be practically confined to a stillwater habitat.

Distribution: 5-6, 10-11, 17-18, 20, 26-30, 32, 36, 54-56, 61, 66, 68.

Family DELOSINIDAE

Genus DELOSINA Wiesner, 1931

246. *Delosina complexa* (Sidebottom)

sensu lato

Fig. 2a-f

Polymorphina? complexa Sidebottom, 1904 etc. (1907), p. 16, pl. iv, figs. 1-9, text-figs. 3-7.

Delosina polymorphinoides Earland. Parr 1943, p. 16.

D. complanata Earland. Parr 1945, pl. x, figs. 1-2.

Three specimens were found at Barwon Heads (56-C8). Parr (1943) listed *D. polymorphinoides* from Barwon Heads, but in his later paper (1945) mentions only *D. complanata* without reference to the earlier record. Two of Parr's slides in the writer's possession may throw some light on this matter. One labelled *D. polymorphinoides* from Barwon Heads, collected by W. Baragwanath, contains 39 specimens of a very variable form, ranging from compressed and biserial to elongate and cylindrical with some of very irregular form. The other slide contained two specimens, both somewhat compressed, and labelled *D. complanata* from the same locality.

The 44 specimens available for study from this one locality show such variation in form that it does not appear practicable to assign them to any one of Earland's species. Some of the smaller specimens are compressed and sub-quadrate and could be referred to *D. complanata*, but the larger specimens are much thicker in proportion and tend to greater in-

flation and irregularity in the addition of chambers. The stitch-like Wiesner canals can be seen in most specimens, but are confined to the distal end of the suture of the final chamber. The septal pores of *D. polymorphinoides* were not observed in any specimens. Fig. 2 shows some of the observed variations in external form.

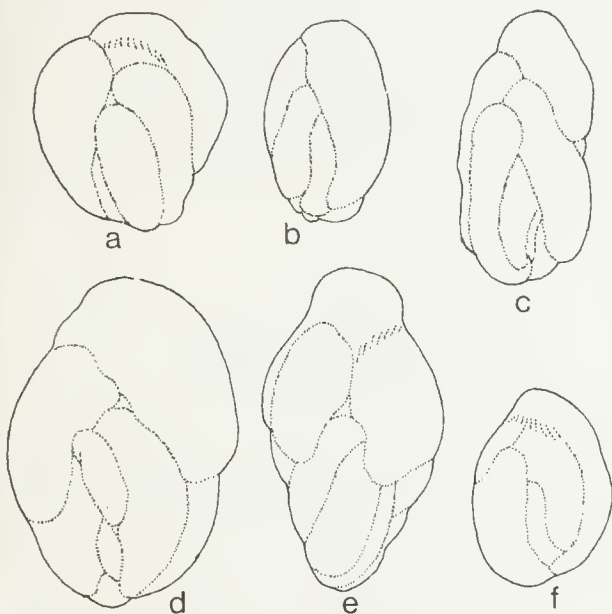


Fig. 2—*Delosina complexa* (Sidebottom) s.l. a-e specimens from slide by W. J. Parr, Barwon Heads; f, Survey coll. stat. C8. All x 42.

As the assemblage of specimens has every appearance of representing a single population, it appears best to record it under Sidebottom's original species *complexa* s.l. though many specimens would not conform to Earland's restricted description of this species. It apparently has a seasonal occurrence at Barwon Heads, as it has been found in only one of the collections made by the writer at this locality. Judging by Parr's slide of 39 specimens, it can occur in considerable numbers on occasion.

Family CASSIDULINIDAE

Genus CASSIDULINA d'Orbigny, 1839

247. *Cassidulina carinata* Silvestri

Cassidulina laevigata d'Orbigny var. *carinata* Silvestri, 1896, p. 104, pl. ii, fig. 10.

Cassidulina carinata Silvestri. Todd 1965, p. 40, pl. 17, fig. 4; Eade 1967, p. 429, fig. 2, Nos. 5-9.

Small, compressed and sharply-keeled specimens with four pairs of chambers in the last whorl are referred to this cosmopolitan species. They were rare in Bass Strait and Lower Bay stations, with one occurrence in the W. Bay. Distribution: 30, 56, 58, 61, 68.

248. *Cassidulina laevigata* d'Orbigny

Cassidulina laevigata d'Orbigny, 1826, p. 282, pl. xv, figs. 4-5; Parr 1945, p. 207.

Small, sub-circular, compressed specimens with angular but not keeled periphery are referred to this species which was recorded by Parr from Barwon Heads. Rare in Bass Strait and Lower Bay stations. Distribution: 50, 56, 58, 68.

249. *Cassidulina delicata* Cushman

Cassidulina delicata Cushman, 1927, p. 168, pl. 6, fig. 5; Parr 1950, p. 343.

Small, sub-circular specimens with broadly rounded periphery and elongated narrow aperture at the base of the apertural face are referred to this species, which was recorded by Parr from E. Bass Strait. Specimens occurred rarely in four stations from Bass Strait and the Lower Bay. Distribution: 50, 58, 68.

250. *Cassidulina* sp. A

Pl. 4, figs. 44a-b

Test sub-circular, inflated, periphery sharply-keeled and twisted, chambers developing lobate extensions toward the centre of the test which obscure early chambers, aperture U-shaped, partly filled by an internal toothplate. *Figured specimen* from 56-C8, Reg. No. G2154. Greatest diameter 0.32 mm, thickness 0.18 mm.

Only one specimen was found, which has not been identified with any described species. Its distinctive characteristics are the twisted carinate periphery and the lobate chamber extensions. It is described and figured for the record by open nomenclature.

251. *Cassidulina inflata* Le Roy

Cassidulina inflata Le Roy, 1944, p. 37, pl. 4, figs. 30-31.

Two specimens are very close to Le Roy's figure, particularly in the angular hood-like shape of the apertural face of the final chamber and the triangular toothplate which partially occludes the aperture.

Distribution: 29, 42.

252. *Cassidulina victoriensis* sp. nov.

Pl. 4, figs. 45a-c

Test sub-oval, compressed, periphery rounded and slightly lobulate, four pairs of chambers in the last whorl, sutures slightly depressed and barely visible, aperture narrowly triangular and open with an internal toothplate, in a rounded depression in the apertural face. Wall finely perforate and polished.

Holotype from 56-C8, Reg. No. G2155. Greatest diameter 0.40 mm, thickness 0.13 mm.

This species is distinguished by its compression and open triangular aperture, and does not appear to correspond to any described species.

Distribution: 30, 50, 56, 68.

Genus *GLOBOCASSIDULINA* Voloshinova, 1960253. *Globocassidulina subglobosa* (Brady)

Cassidulina subglobosa Brady, 1879 etc. (1881), p. 60; 1884, p. 430, pl. liv, fig. 17; Parr 1945, p. 207; 1950, p. 343.

Globocassidulina subglobosa (Brady). Eade 1967, p. 437.

This is the commonest cassidulinid in Port Phillip and adjacent waters, though rare N. of the Lower Bay. Specimens are similar to Brady's figure, with slight elongation of the ultimate chamber and a simple loop-shaped aperture without basal prolongations.

Distribution: 33, 38, 43, 50, 56, 58-62, 66-68.

254. *Globocassidulina minuta*? (Cushman)

Cassidulina minuta? Cushman, 1933: p. 92, pl. 10, figs. 3a-c; Todd 1965, p. 43, pl. 17, fig. 3.

Globocassidulina minuta (Cushman). Eade 1967, p. 437, fig. 5, Nos. 2-3.

Specimens matching Eade's figures were found in three Bass Strait and Lower Bay

stations. Whether they represent Cushman's species is open to some doubt. His original description states that the aperture is "elongate, 4-5 times as long as broad", and his fig. 3b shows only a slit following the junction of the last and penultimate chambers. Todd, working with the same Pacific material, states that the outer end of the apertural slit continues into a loop-shaped opening extending into the apertural face, but her fig. 3b, apparently reproduced from Cushman, does not show this character. This apparent contradiction cannot be resolved from the present material, and the question is accordingly left open.

Distribution: 50, 56, 68.

Genus *EHRENBURGINA* Reuss, 1850255. *Ehrenbergina aspinosa* Parr

Ehrenbergina pacifica Cushman var. *aspinosa* Parr, 1950, p. 345, pl. xiii, figs. 1-2.

Specimens were found at 11 Bass Strait and Lower Bay stations. Nearly all were dorsally smooth with narrow limbate sutures, only two showing some ridging of the sutures in the early chambers. All were lacking in marginal spines, the sharply-keeled edges showing no signs of having originally had spines which were subsequently lost by attrition.

Eade (1967, p. 444) suggests that raised sutures on the dorsal side are characteristic of this species, but Parr did not mention this in his description, and his figure shows raised sutures on the early chambers only. A slide from Parr's collection, labelled as from 35 km E. of Narrabeen, N.S.W., 145 m, contains seven specimens in which all the dorsal sutures are raised, sharp-edged and frill-like, and the periphery is spined. These were named by Parr (incorrectly in the writer's opinion) as *E. pacifica* Cushman.

They appear to correspond with the Pacific specimens studied by Eade and referred to *E. aspinosa*. The present specimens appear to be distinct and are considered to represent more correctly the form described and figured by Parr.

Distribution: 50, 56, 58, 61, 66, 68-69.

256. *Ehrenbergina* cf. *glabra* Heron-Allen and Earland

cf. *Ehrenbergina hystrix* Brady var. *glabra* Heron-Allen and Earland, 1922, p. 140, pl. v, figs. 1-6, 11.
cf. *E. glabra* Heron-Allen and Earland. Chapman and Parr 1937, p. 84; Parr 1950, p. 344; Eade 1967, p. 445.

One specimen from Barwon Heads (56-C8) has the smoothly-rounded ventral area characteristic of this species, but is lacking in peripheral spines, the marginal keel showing no signs of having had spines or even angular chamber extensions. It may fall within the limits of variation of *E. glabra* but in the lack of a series for comparison is recorded by open nomenclature.

Superfamily NONIONACEA

Family NONIONIDAE

Subfamily NONIONINAE

Genus NONION de Montfort, 1808

257. *Nonion depressulus* (Walker and Jacob)

Nautilus depressulus Walker and Jacob, 1798, p. 641, pl. xiv, fig. 23.

Nonion depressulus (W. and J.). Parr 1945, p. 215; Murray 1965, p. 148, pl. 25, figs. 6-7, pl. 26, figs. 7-8.

Specimens were common in the Barwon Estuary (56-C9) and in Swan Bay, and occurred rarely in the W. Bay. The wall structure is granular, finely pored and translucent. Specimens compared well with others from Broadstairs on the Kentish coast (from which the species was described). Locally the species favours shallow, muddy, stillwater conditions, and is tolerant of lowered salinity. Distribution: 5, 31, 49, 56.

Genus ASTRONONION Cushman and Edwards, 1937

258. *Astrononion australe* Cushman and Edwards

Astrononion australe Cushman and Edwards, 1937, p. 83, pl. 3, figs. 13-14.

Rare at Barwon Heads and in Areas 58 and 59. Specimens are somewhat smaller but otherwise compare well with others from the type sample (Lower Beds, Muddy Cr., Vict.). Occurrence in stations just within Port Phillip

Heads where Tertiary contamination is unlikely is considered to justify recording these specimens as Holocene.

259. *Astrononion novozealandicum* Cushman and Edwards

Astrononion novozealandicum Cushman and Edwards, 1937, p. 35, pl. 3, figs. 18a-b.

This species, characterised by its narrow tubular sutural flaps, occurred in small numbers in ten Bass Strait and Lower Bay stations and in two localities in the W. Bay. Specimens compared well with others from off New Zealand.

Distribution: 5, 16, 50, 56, 58-61, 66, 68-69.

Genus FLORILUS de Montfort, 1808

260. *Florilus grateloupi* (d'Orbigny)

Nonionina grateloupi d'Orbigny, 1826, p. 24, No. 19; 1839A, p. 46, pl. 6, figs. 6-7.

Rare specimens from five stations within Port Phillip agree with a Cuban specimen of *F. grateloupi*. The species has been recorded from the E. Pacific and from the Falkland Is.

Distribution: 5, 13, 28, 49, 61.

261. *Florilus scapha* (Fichtel and Moll)

Nautilus scapha Fichtel and Moll, 1798, p. 105, pl. xix, figs. d, f.

Nonion scapha (F. and M.). Cushman 1939, p. 20, pl. 5, figs. 18-21; Parr 1945, p. 215.

Common at Barwon Heads and found also in the Lower Bay and at seven stations in the W. Bay. Specimens are small but otherwise characteristic.

Distribution: 6, 16-18, 26-28, 49, 56, 58, 61, 68.

Genus NONIONELLA Cushman, 1926

262. *Nonionella pulchella* Hada
Pl. 4, figs. 46a-c

Nonionella pulchella Hada, 1931, p. 120, fig. 79 (in text).

Two specimens having the characteristic cusped umbilical lobe were found in Area 68.

Figured specimen from 68-156, Reg. No. G2156. Length 0.28 mm, breadth 0.19 mm, thickness 0.12 mm.

263. *Nonionella* aff. *parri*

aff. *Nonionella parri* Cushman, 1936A, p. 89, pl. 13, figs. 17a-c.

Rare specimens from four stations in the Lower Bay and in Area 13 have the assymetrical shape, sub-acute periphery, limbate sutures and umbilical ornament of this species, but are much smaller, about 0.25 mm in length. From the material available, identification with Cushman's species, described from Holocene shore sand, New Zealand, is uncertain.

Distribution: 13, 50, 59, 68.

264. *Nonionella vortex* sp. nov.

Pl. 4, figs. 47a-c

Test sub-circular, inequilaterally planispiral, compressed, parallel-sided, with up to 13 chambers in the last whorl. Chambers narrow and strongly curved, the last 3-4 increasingly curved toward the umbilicus. Sutures limbate and raised in early chambers, depressed in later chambers. Umbilicus slightly depressed and finely papillate, periphery rounded, aperture obscure, apparently basal.

Holotype from 68-155, Reg. No. G2157. Greatest diameter 0.27 mm, thickness 0.08 mm.

The nearest described species appears to be *N. cockfieldensis* Cushman and Ellisor from the Eocene of Texas. *N. vortex* differs in having more chambers in the final whorl, a broadly rounded periphery and in being more or less parallel-sided rather than increasing in thickness in later chambers. Only two specimens were found at station 155, but the characters appear sufficiently distinctive to justify description as new.

Genus PULLENIA Parker and Jones, 1862

265. *Pullenia bulloides* (d'Orbigny)

Nonionina bulloides d'Orbigny, 1846, p. 107, pl. v, figs. 8-10.

Pullenia bulloides (d'Orbigny). Cushman and Todd 1943, p. 13, pl. 2, figs. 15-18.

Small but characteristic specimens were found at four stations in Areas 50 and 58 near the entrance to Port Phillip.

266. *Pullenia quinqueloba* (Reuss)

Nonionina quinqueloba Reuss, 1851, p. 71, pl. 5, fig. 31.

Pullenia quinqueloba (Reuss). Cushman and Todd 1943, p. 10, pl. 2, fig. 5, pl. 3, fig. 8.

Specimens with five chambers in the final whorl and a slightly lobulate periphery, somewhat angular but rounded in edge view, are referred to this cosmopolitan species. They were found at Barwon Heads and in Areas 58, 61 and 68.

Family ALABAMINIDAE

Genus GYROIDINA d'Orbigny, 1826

267. *Gyroidina soldanii* d'Orbigny

Gyroidina soldanii d'Orbigny, 1826, p. 278, No. 5; Parr 1950, p. 360.

Specimens were small but have the morphological characters of this species, including a slit-like aperture confined to the middle of the apertural face and a supplementary aperture below the umbilical flap. They occurred rarely in eight Bass Strait and Lower Bay stations.

Distribution: 50, 56, 58-60, 62, 66, 69.

Genus SVRATKINA Pokorný, 1956

268. *Svratkina australiensis* (Chapman, Parr and Collins)

Discorbis tuberculata Balkwill and Wright var. *australiensis* Chapman, Parr and Collins 1934, p. 563, pl. viii, figs. 9a-c.

Svratkina australiensis (C. P. and C.). Pokorný, 1956, p. 257.

This species was described from the Balcombian (Mid. Miocene) of Balcombe Bay on the SE. coast of Port Phillip, but was also recorded by the authors as a Holocene species from Williamstown at the N. end of Port Phillip. In the present collections it occurs rarely at eight stations in the Lower Bay and Bass Strait, and was not found N. of Areas 50-55.

Distribution: 50, 55-56, 60-61, 63, 68.

Superfamily ANOMALINACEA

Family ANOMALINIDAE

Subfamily ANOMALININAE

Genus ANOMALINA d'Orbigny, 1826

269. *Anomalina tasmanica* Parr

Anomalina tasmanica Parr. 1950, p. 406, pl. xiv, figs. 4a-c.

Frequent at Barwon Heads (56-C8) and occurring also at other Lower Bay and Bass Strait stations.

Distribution: 50-51, 56, 58-61, 66, 68-69.

Genus ANOMALINOIDES Brotzen, 1942

270. *Anomalinoides nonionoides* (Parr)

Anomalina nonionoides Parr, 1932, p. 231, pl. xxii, fig. 38; 1945, p. 214; 1950, p. 362; Albani 1968, p. 117, pl. 10, fig. 11.

Specimens were not uncommon in Bass Strait and Lower Bay stations. They are generally smaller than N.S.W. specimens, but are considered to be conspecific. In this species the aperture is not confined to the periphery, but continues along the base of the chamber on the spiral side, requiring transfer to *Anomalinoides*. This feature is clearly seen in specimens from Parr's type sample, from Narrabeen, N.S.W.

Distribution: 43, 50, 56, 58, 60-62, 66, 68.

Genus KARRERIA Rzehak, 1891

271. *Karrerria maoria* (Finlay)

Vagocibicides maoria Finlay, 1939 etc. (1939), p. 326, pl. 29, figs. 148-151, 158.

Dyocibicides laevis Parr, 1950, p. 365, pl. 15, figs. 8a-c.

Vagocibicides cf. *maoria* Finlay. Collins 1953, p. 103, pl. 1, figs. 9a-c.

V. maoria Finlay. Carter 1964, p. 90, pl. 6, figs. 116-120.

Karrerria maoria (Finlay). Loeblich and Tappan 1964, p. C670, fig. 623, 19.

Single specimens were found at 50, 56, 59-60, 67, all in Bass Strait or the Lower Bay. The species is recorded from the Miocene of Gippsland and the Pleistocene of Port Fairy, both in Victoria.

Genus TRICHOHYALUS Loeblich and Tappan, 1953

272. *Trichohyalus australis* sp. nov.

Pl. 4, figs. 48a-c

Test trochospiral, compressed, with broadly rounded periphery. Spiral side convex with all chambers visible, eight in the last whorl, sutures slightly depressed and recurved, wall coarsely perforate. Umbilical side flat with depressed umbilical area obscured by pustular secondary

growth, sutures depressed and recurved, later chambers inflated, wall finely perforate with scattered larger pores. Aperture obscure, presumably umbilical.

Holotype from 49-C6, Reg. No. 2158. Greatest diameter 0.35 mm, thickness 0.14 mm.

This southern form was first recorded as *T. tropicus* (Collins) (in Gill 1972, pp. 317-318) from an emerged shellbed of mid-Holocene age on the banks of a creek running into Corio Bay in Area 26. At the time it was noted that there were differences between it and the Barrier Reef species, and that it might represent a cool water modification.

On further consideration, these differences appear to justify specific separation. The broadly rounded periphery contrasts with the comparatively sharp edge of *T. tropicus*, the pustules are large and blister-like, and are confined to the umbilical area, reaching about halfway to the periphery, compared with the fine grained outgrowth which covers all but the last two chambers in that species.

Only two specimens were found in the present collections (Areas 5, 49). Until more specimens are available the wall structure is left undetermined.

Superfamily ROBERTINACEA

Three of the genera listed below have been shown by McGowran (1966a, 1966b) to be unrelated to this superfamily. *Ceratobuliminoides* is considered to be distinct from *Ceratobulimina* and probably related to *Heronallenia*. *Stomatorbina* and *Mississippina* are considered as probable constituents of a new family of unstated classification. The writer is unaware of any approach to finality in these matters, and accordingly has retained the species concerned in the classification adopted for the purposes of record only, without expressing any opinion on the suprageneric classification involved.

Family CERATOBULIMINIDAE

Subfamily CERATOBULIMININAE

Genus CERATOBULIMINOIDES Parr, 1950

273. *Ceratobuliminoides bassensis* Parr

Ceratobuliminoides bassensis Parr, 1950, p. 359, pl. xiv, figs. 12a-c.

Two specimens were found at Barwon Heads (56-C8).

Subfamily EPISTOMININAE

Genus MISSISSIPPINA Howe, 1930

274. *Mississippina pacifica* Parr

Mississippina pacifica Parr, 1950, p. 361, pl. xiv, figs. 17a-c.

Specimens were frequent at Barwon Heads (56-C8) and occurred also in Arcas 50, 58, 62, and 68.

Genus STOMATORBINA Dorreen, 1948

275. *Stomatorbina concentrica* (Parker and Jones)

Pulvinulina concentrica Parker and Jones, in Brady 1864, p. 470, pl. xlviii, fig. 14.

Stomatorbina concentrica (P. and J.). Parr 1950, p. 360.

Two small specimens were found at Barwon Heads (56-C8). The species is more commonly found in deep water.

Subfamily ROBERTININAE

Genus ROBERTINA d'Orbigny, 1846

276. *Robertina tasmanica* Parr

Robertina tasmanica Parr, 1950, p. 369, pl. xv, figs. 10a-b, 11a-b.

One specimen from Barwon Heads (56-C8) has a somewhat tapering test similar to Parr's fig. 11. The species was described from off Tasmania.

Genus PSEUDOBULIMINA Earland, 1934

277. *Pseudobulimina chapmani* (Heron-Allen and Earland)

Bulimina chapmani Heron-Allen and Earland, 1922, p. 130, pl. iv, figs. 18-20.

Pseudobulimina chapmani (H. A. and E.). Earland 1934, p. 134, pl. vi, figs. 11-14; Parr 1950, p. 370.

Rare specimens occur at several Bass Strait and Lower Bay stations. They are small compared with Antarctic specimens, discoloured and with black-stained sutures, and have pre-

sumably been transported from deeper water. Distribution: 50, 56, 59, 61, 66.

Genus UNGULATELLA Cushman, 1931

278. *Ungulatella pacifica* Cushman

Ungulatella pacifica Cushman. Cushman, 1931, p. 82, pl. 10, figs. 11-12; Collins 1958, p. 388, pl. iv, fig. 8.

One specimen was found at Barwon Heads (56-C8). Unfortunately it was lost during mounting for illustration. The presence of this rare tropical species is a further indication of the small warm-water element remaining in Victorian waters.

INCERTAE SEDIS

279. '*Webbinella bassensis*' Parr

Pl. 4, figs. 48-49

'*Webbinella bassensis*' Parr, 1945, p. 193, pl. vii, figs. 3a-c.

This organism was described from shore sand at Barwon Heads, and consists of a dome-shaped, agglutinated, hollow shell with a chitinous lining, having evidence of former attachment by a narrow inward-turning agglutinated rim surrounding a basal opening normally covered by a clear chitinous film. Parr's specimens were all detached, some showing a striated pattern on the surface of attachment, suggesting previous adherence to a fibrous substrate. His reference to *Webbinella* has since been invalidated by Loeblich and Tappan (1957) who showed that this genus is an attached polymorphinid, unrelated to agglutinated species of the same shape for which the genus *Hemisphaerammina* was erected.

No specimens have been found in any of the collections made by the writer at the type locality, but both attached and detached specimens were not uncommon at station C9 in the estuarine section of the Barwon River, an environment of mud-flats and mangroves. The attached specimens are cemented to hard surfaces such as sand grains, small molluscan shells and shell fragments, but the evidence of Parr's specimens suggests alternative attachment to algae, mangrove roots, etc.

Specimens were at first identified as *Hemisphaerammina bassensis* (Parr). The writer is indebted to Mr K. N. Bell for drawing his attention to a paper by Adegoke, Dessauvage and Yoloye (1969) in which a similar form from brackish-water lagoons in Nigeria, first thought to be a species of *Hemisphaerammina*, was found to be the egg-capsule of a gastropod, *Neritina* sp. Following this hint, specimens were broken open or detached, and in some cases were found to contain a chitinous molluscan protoconch (fig. 49), a parallel situation to that in the above reference. Accordingly, Parr's species is not a foraminiferid, and the name must be allowed to lapse.

As might be expected, these capsules differ in some respects from the Nigerian form. They are usually more than half an oblate spheroid in shape, contracting in diameter toward the base. The wall is comparatively thick, consisting of fine sand grains weakly cemented, with scattered larger grains built in and appearing on the surface. Another difference is that each capsule contains one embryo only which nearly fills the cavity, rather than several as in the Nigerian example.

The relationship of these egg-capsules is yet to be established. *Neritina* spp. are found in estuarine conditions in N.S.W. and Qld., but the genus does not appear to have been recorded locally. As it no longer concerns the foraminiferid fauna of the Survey, the question is left for future investigation.

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24. *Discorbinella infrapapillata* sp. nov. Holotype, 'a' spiral side, 'b' umbilical side, 'c' edge view, x88.
25. *Neoconorbina terquemi* (Rzehak). Figured specimen, 'a' spiral side, 'b' umbilical side, 'c' edge view, x88.
26. *Pseudohelenuina collinsi* (Parr) gen. nov. Plesio-type, 'a' spiral side, 'b' umbilical side, 'c' edge view, x50.
27. *Rugidia simplex* sp. nov. Holotype, 'a' spiral side, 'b' umbilical side, 'c' edge view, x88.
28. *Valvulineria minutissima* sp. nov. Holotype, 'a' spiral side, 'b' umbilical side, 'c' edge view, x88.

PLATE 3

29. *Valvulineria victoriensis* sp. nov. Holotype, 'a' umbilical side, 'b' spiral side, 'c' edge view, x70.
30. *Ammonia aoteanus* (Finlay). 'a' umbilical side, 'b' spiral side, 'c' edge view, x44.
31. *Elphidium articulatum multicameratum* subsp. nov. Holotype, 'a' side view, 'b' edge view, x44.
32. *Elphidium earlandi avalonense* subsp. nov. Holotype, 'a' side view, 'b' edge view, x88.
33. *Elphidium granulosum* sp. nov. Holotype, 'a' side view, 'b' edge view, x88.
34. *Elphidium gunteri corioense* subsp. nov. Holotype, 'a' side view, 'b' edge view, x88.
35. *Elphidium vitreum* sp. nov. Holotype, 'a' side view, 'b' edge view, x 88.
36. *Rosalina parri* sp. nov. Plesiotype, 'a' umbilical side, 'b' spiral side, 'c' edge view, x44.
37. *Planulina bassensis* sp. nov. Holotype, 'a' umbilical side, 'b' spiral side, 'c' edge view, x84.
38. *Cibicides* sp. A. 'a' umbilical side, 'b' spiral side, 'c' edge view, x 44.
39. *Cibicides* sp. A. *Dyocibicides*-form, spiral side, x44.
40. *Cibicides* sp. A. *Rectocibicides*-form, umbilical side, x55.

PLATE 4

41. *Cibicides phillipensis* sp. nov. Holotype, 'a' umbilical side, 'b' spiral side, 'c' edge view, x44.
42. *Cibicides wattsi* sp. nov. Holotype, 'a' umbilical side, 'b' spiral side, 'c' edge view, x88.
43. *Planorbulina* sp. A. 'a' general view, 'b' part edge view showing multiple apertures, x44.
44. *Cassidulina* sp. A. 'a' side view, 'b' edge view, x88.
45. *Cassidulina victoriensis* sp. nov. Holotype, 'a' apertural side, 'b' other side, 'c' edge view, x88.
46. *Nonionella pulchella* Hada. x110.
47. *Nonionella vortex* sp. nov. Holotype, 'a' and 'b' side views, 'c' edge view, x110.
48. *Trichohyalus australis* sp. nov. 'a' umbilical side, 'b' spiral side, 'c' edge view, x88.
49. "*Webbinella bassensis* Parr". Two egg-capsules deposited one over another on a molluscan shell, x36.
50. "*Webbinella bassensis* Parr". Basal view of capsule detached from substrate, showing contained molluscan embryo, x44.

Explanation of Plates 1-4

PLATE 1

1. *Reophax barwonensis* sp. nov. Holotype, x88.
2. *Haplophragmoides pusillus* sp. nov. Holotype, 'a' side view, 'b' apertural view, x88.
3. *Ammobaculites? barwonensis* sp. nov. Holotype, 'a' side view, 'b' end view, x88.
4. *Ammotium australiensis* (Collins). 'a' side view, 'b' apertural view, x44.
5. *Trochammina* sp. A. 'a' umbilical side view, 'b' spiral side view, 'c' apertural view, x82.
6. *Quinqueloculina poeyana victoriensis* subsp. nov. Holotype, 'a' side view, 'b' apertural view, x66.
7. *Triloculina sabulosa* sp. nov. Holotype, 'a' side view, 'b' apertural view, x82.
8. *Scutuloris parri* sp. nov. Holotype, 'a' and 'b' side views, 'c' apertural view, x82.
9. *Dimorphina* sp. A. x44.
10. *Lagena bassensis* sp. nov. Holotype, x88.
11. *Lagena lonsdalensis* sp. nov. Holotype, x66.
12. *Lagena nepeanensis* sp. nov. Holotype, x88.
13. *Lagena portseuensis* sp. nov. Holotype, x88.
14. *Bolivina pendens* sp. nov. Holotype, 'a' side view, 'b' apertural view, x88.
15. *Laryngosigma australiensis* sp. nov. Holotype, 'a' side view, 'b' apertural view, x88.
16. *Oolina guttaformis* sp. nov. Holotype, 'a' side view, 'b' apertural view.

PLATE 2

17. *Fissurina crassiannulata* sp. nov. Holotype, 'a' side view, 'b' edge view, x88.
18. *Fissurina furcata* sp. nov. Holotype, 'a' side view, 'b' edge view, x110.
19. *Fissurina multipunctata* sp. nov. Holotype, 'a' side view, 'b' apertural view, x110.
20. *Fissurina pseudoformosa* sp. nov. Holotype, 'a' side view, 'b' edge view, x88.
21. *Pavonina triformis* Parr. Figured specimen, x88.
22. *Euuvigerina compacta* sp. nov. Holotype, 'a' side view, 'b' apertural view, x88.
23. *Hopkinsina victoriensis* sp. nov. Holotype, 'a' side view, 'b' apertural view, x88.

